JAN 28 1948

ENGINEERING NEWS-RECORD

A McGRAW-HILL PUBLICATION

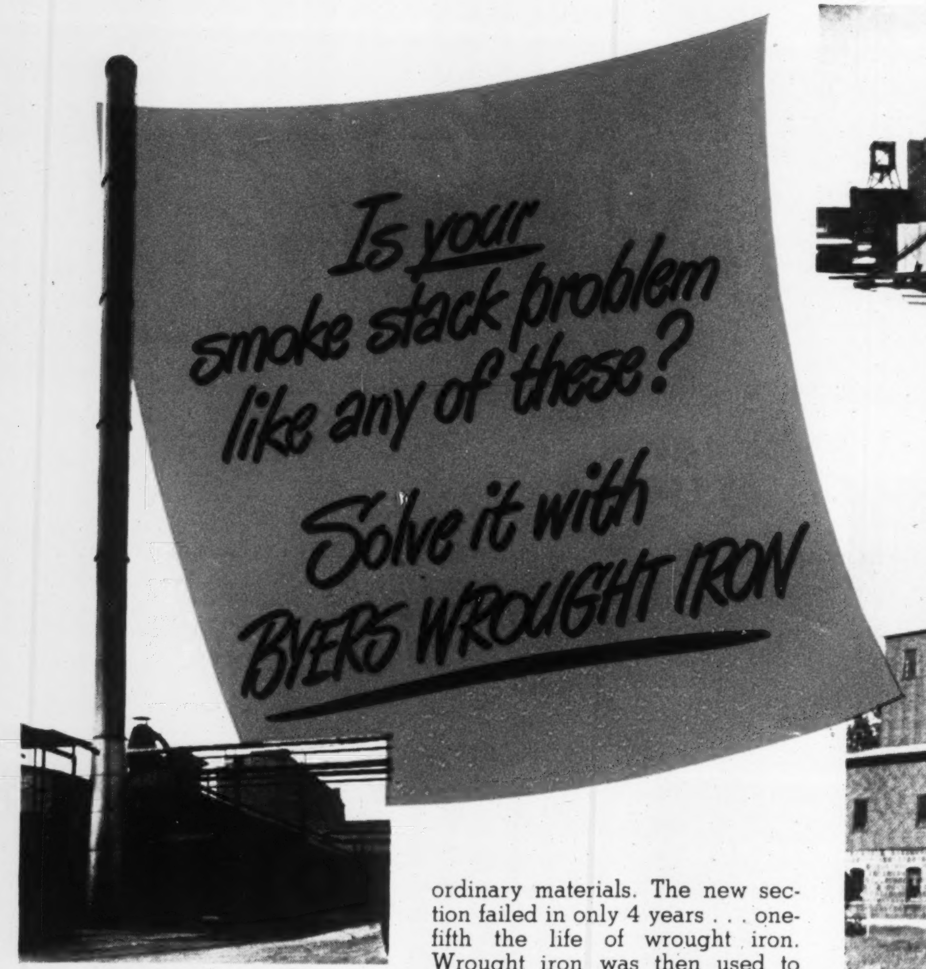
JANUARY 22, 1948

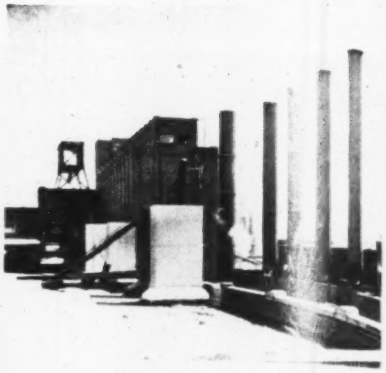
Light weight and high strength characterize aluminum roofing for an industrial plant

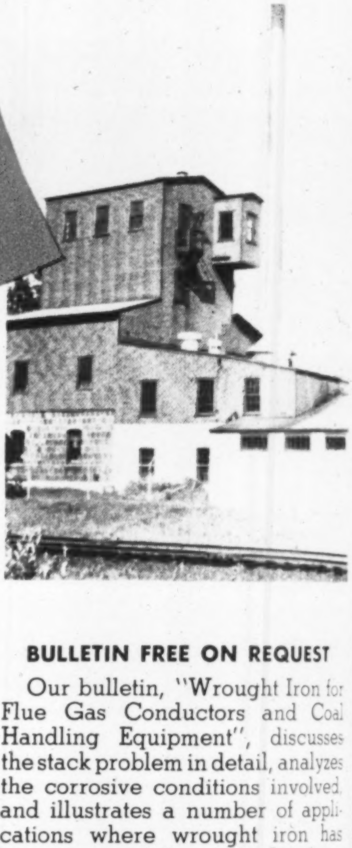
UDING ARTICLES ON:

TRAPPING SAND IN A WATER SUPPLY

200-FT. STEEL PILES SUPPORT N. Y. PIER







A large manufacturing plant in Pennsylvania needed a 130-foot stack . . . a paper mill in Maine required four new stacks to take care of expanded facilities . . . a chemical company in New York wanted a 54-foot stack. In all three instances the designers and engineers recognized the hazards that an unlined metal stack must face, and chose the same time-proven means of getting maximum life from the installations. All the new stacks were fabricated of Byers Wrought Iron.

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Volume 140 • Number 4

January 22, 1948

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WALDO G. BOWMAN........*Editor*

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ANNUAL SURVEY AND FORECAST

Once a year the editors of *Engineering News-Record* produce an issue that summarizes what has happened in the past year and what appears to be ahead. This combination mirror and crystal-ball act is billed for appearance Feb.

The issue will contain three major sections: Editorial survey and forecast, construction business statistics and an inventory of the status of major projects. In addition, there will be two feature articles outlining where we stand on housing and what is happening in the field of engineering and construction abroad.

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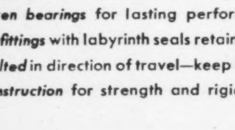

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Construction Trends

1947 Construction Volume Exceeds 1946 Record by 9%

The dollar volume of heavy engineering construction contract awards, as recorded by *Engineering News-Record*, rose in December to $503,384,000 from the November volume of $474,357,000, a gain of 6 percent. Thus, the four-weeks moving average at the end of December rose to a new postwar monthly high of $139,145,000, exceeding the previous postwar high of $134,877,000 reached at the end of April, 1946 by 3 percent and the previous 1947 high by 12 percent.

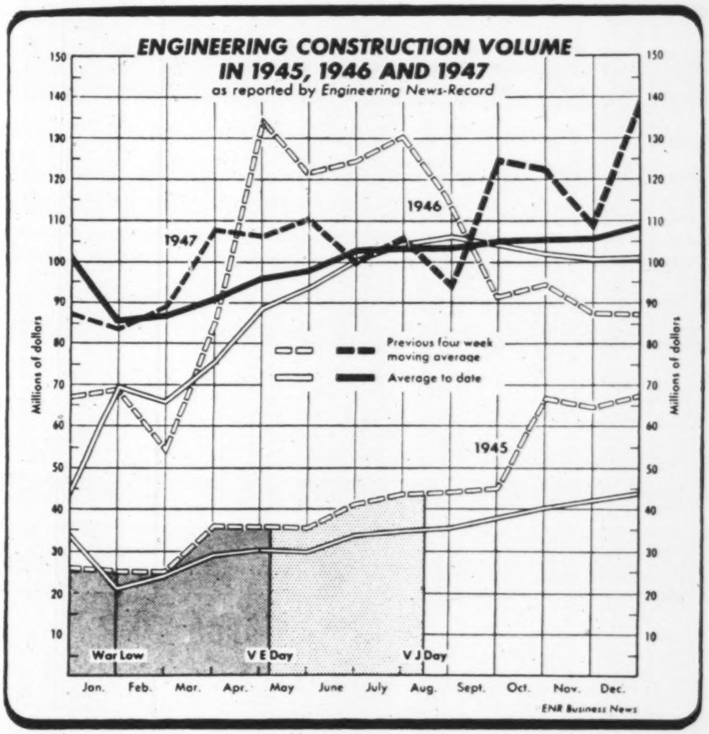
Compared with December, 1946, when the moving average was computed at $87,771,000, the average at the end of December, 1947 showed a rise of 59 percent. December was the fourth consecutive month in which contract awards exceeded the awards made in the corresponding month of 1946. Contracts were 43 percent ahead of 1946 in December, 72 percent in November, 18 percent in October, 33 percent in September.

The dollar volume of construction contract awards for the average week of 1947 amounted to $108,831,000, 9 percent greater than the weekly average for 1946 of $99,539,000. This compares with a gain of 1 percent at the end of September, 3 percent at the end of October and 7 at end of November.

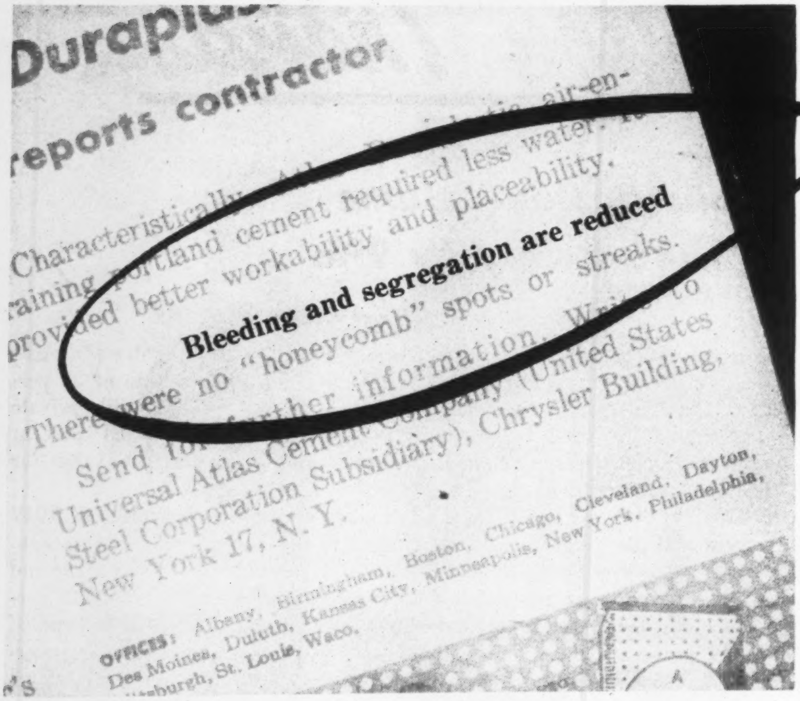
Cumulative total of construction contract awards for the full year of 1947 rose 9 percent to $5,659,232,000 from the $5,176,034,000-total for 1946. Public contract awards amounted to $2,491,431,000 for 1947, a gain of 23 percent over the 1946 total of $2,018,363,000, while private awards amounted to $3,167,801,000, or 0.3 percent greater than the contract awards of $3,157,671,000 for 1946.

Public contracts during the last four months of 1947 have been accumulating at a faster rate than a year ago. Contract awards were 13 percent ahead of 1946 at the end of September, 14 percent at the end of October, 18 percent at the end of November and 23 percent at the end of the year. Although private contract awards were averaging nearly 30 percent above 1946 during this four-month period, the year-end gains were only sufficient to permit contracts to rise 0.3 percent for the year from the 1946 total. Private contracts at the end of August were 10 percent below the 1946 10-month total.

Federal contracts for the full year amounted to $656,419,000, a gain of 10 percent over the 1946 volume while state and municipal contracts totaled $1,835,012,000, a gain of 29 percent. During the last four months of 1947, however, federal contracts made the greater gain as compared with a year ago, rising 87 percent above the corresponding 1946 volume while state and municipal contracts rose 45 percent.



The fact that...



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News of the Week

ENGINEERING NEWS-RECORD • JANUARY 22, 1948 • VOLUME 140 • NUMBER 4

Senate okays $487 million for defense construction

Quick action by House expected on two bills providing contract authority for building at military and naval installations in U. S. and abroad

Moving to clear its books of legislative matters started last summer, the Senate last week passed two measures authorizing a total of $487,485,859 of national defense construction divided between the Departments of the Army and Navy.

The Army would be permitted to enter into contracts for $247,530,660, and the Navy $239,955,200 under the two measures during the remainder of fiscal year 1948 although no funds are actually appropriated. Early action is expected in the House, since similar bills were reported out by the House Armed Services Committee last July (*ENR* July 10, 1947, vol. p. 22) and the House is now free to act on the measures.

Coming so closely on the heels of President Truman's budget message requesting funds for the same purpose, the Senate action bears a somewhat complicated relationship to the budget communication.

In his message (*ENR* Jan. 15, vol. p. 75) Mr. Truman asked $165,000,000 in cash and $170,000,000 in contract authority for the 1948 fiscal year for the Army; and $25,000,000 in cash for the Navy in fiscal year 1949. A major share of the money requested by the President would be used to finance projects mentioned in the two measures just approved by the Senate, and some would be used to continue projects already under way.

Washington observers agree that Congress is certain to trim the President's $39,700,000,000 budget, but are sure that a substantial portion of the funds he requested for national defense construction will be approved.

Army projects listed

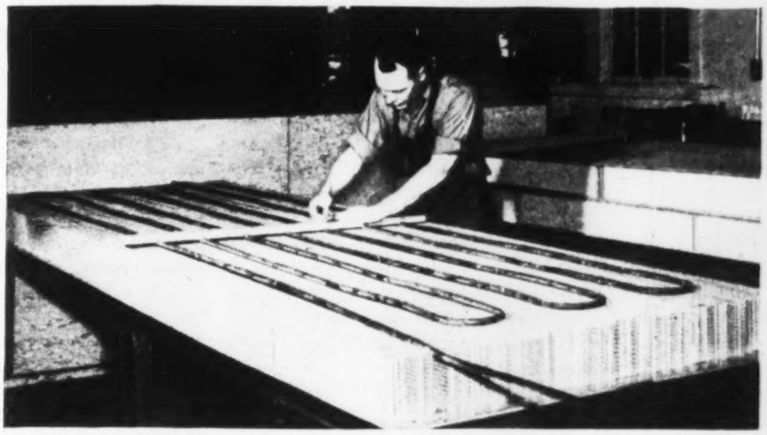
Cost of Army work within the continental United States is limited to $107,280,960 and that outside to $140,249,699. The Senate-approved bill further specifies that not over $100,000,000 can be appropriated for work in the U. S. during the present fiscal year (which ends June 30) and not to exceed $125,000,000 for projects elsewhere.

Largest Army jobs on the mainland authorized include: Hangar and other construction at the Rapid City, S. D. bomber base, $6,500,000; test facilities at Muroc Army Airfield, Calif., $4,000,000; Letterman General Hospital, San Francisco, $1,400,000; U. S. Military Academy, West Point, N. Y., $3,250,000; housing, warehouse, and test facilities at Eglin Field, Fla., $3,140,000; Picatinny Arsenal in New Jersey, $2,000,000; housing, training facilities, and utilities at Fort Worth Army Airfield, Texas, $2,400,000; and special testing facilities at Wright Field, Ohio, $2,000,000.

Construction of housing and utilities at a large number of Army centers accounts for most of the remaining authorized work within the U. S. Largest of these jobs are: Andrews Field, Md., $3,140,000; Camp Hood, Tex., $1,500,000; Ft. Sam Houston, Tex., $2,000,000; Camp Lee, Va., $4,200,000; Ft. Lewis, Wash., $4,200,000; and Ft. Knox, Ky., $4,600,000.

Army posts on the mainland where between $1,000,000 and $2,000,000 of housing and utilities construction is authorized include: Alamogordo Airfield, N. M.; Ft. Belvoir, Va.; Ft. Benning, Ga; Bergstrom Field, Tex.; Biggs Field, Tex.; Ft. Bragg, N. C.; Chanute Field, Ill.; Camp Detrick, Md.; Goodfellow

(*Continued on page 57*)



***Sandwich House**—"Sandwich" panels, originated during the war for high-speed aircraft, are now undergoing critical tests at the U. S. Forest Products Laboratory at Madison, Wis., for their possible use in housing construction. An experimental structure consists almost entirely of building panels made with a core very similar to brown kraft paper, treated with synthetic resin, corrugated and glued together in honeycomb fashion. Covers glued to the cores are of thin metal, plywood, veneer, or other sheet material. Resultant panels are light in weight—a 4 x 8 ft. wall panel, 2 or 3 in. thick, can be handled by one man—and the panels could be mass produced readily. A test "house" at Madison, equipped with radiant heating, is in reality a shell exposed to the weather to test wearing qualities of the panels.*

NEWS IN BRIEF

In telegraphic form, here are latest news developments on the engineering and construction front during the week.

Public Construction — Bids submitted last week are being studied for a 200-bed general medical hospital for the VA at *Fort Wayne, Ind.* Low bid was $4,697,000—only a little above the government estimate. . . . The gymnasium of Syracuse University, *Syracuse, N. Y.*, destroyed by fire some time ago, is to be reconstructed at a cost of about $3,755,000. . . . *Mississippi* announced a 1948 program for the construction of 19 hospitals and 11 health department quarters at a cost of over $6,000,000. . . . Work will start soon on the 52-bed Tipton County Hospital at *Tipton, Ind.* . . . Funds are in hand for the $1,300,000 School of Theology building at Boston University, *Boston, Mass.* . . . The Hall-County Authority has plans for a 111-bed hospital to be erected at *Gainesville, Ga.*, cost $1,250,000.

Industrial Construction — The old Hippodrome site at East 43rd St. and Avenue of the Americas (6th Ave.) *New York City*, has been purchased for the erection of a parking garage to accommodate several thousand cars. . . . Socony Vacuum Oil Co. is planning a replacement and rehabilitation program at its *East St. Louis, Ill.*, refinery to cost several million dollars. . . . Hotels Statler Co., Inc., will seek bids in the spring for a 1,350-room hotel and 13-story office building in downtown *Los Angeles, Calif.*, to cost about $20,000,000. . . . The Gospel Publishing Co., *Springfield, Mo.*, will build a $1,000,000 publishing plant. . . . Contract has been let for a $1,150,000 addition to the Northwestern Bell Telephone Co. headquarters building at *Des Moines, Ia.*, Arthur H. Neumann & Bros. Inc., Des Moines have the general contract. . . . A large shopping center building with parking for 4,000 cars is planned at *Framingham, Mass.* It may cost $7,000,000.

Housing—Construction will start in March on the 10-story $1,250,000 Town House apartments at Robles Ave. and Del Mar St., *Pasadena, Calif.* . . . Nipark Realty Corp. has announced the beginning of work on a $10,000,000 privately-financed development of 850 rental apartments in the Forest Hills section of the Borough of Queens, *N. Y. City*.

Highways—The *Kentucky* General Assembly is to be asked to approve a proposal for a $40,000,000 super-highway running north and south through the state. The new roadway would be modeled after the Pennsylvania Turnpike and cost would be met from tolls and concessions. . . . The *Indiana* State Highway Commission signed contracts for highway and bridge construction in December totaling $2,599,337. More than $37,000,000 is scheduled to be spent on road improvements in *Louisiana* during 1948. . . . In *Arizona* a total of 67 projects for 400 miles of road at a cost of $10,637,987 was completed in 1947. . . . *Indiana* county highway departments are experiencing difficulty in obtaining a sufficient supply of gasoline to keep all of their highway maintenance trucks in operation. . . . The *Virginia* highway department in 1947 spent nearly $20,000,000 for maintenance and construction on its 38,000-mile secondary system of highways. . . . A $13,000,000 master highway and traffic plan for *Macon, Ga.*, has been completed by the H. W. Lochner Co. of Chicago, Ill. . . . Contract for widening the Newburyport Turnpike from the Peabody line to Maple Street, Danvers, intersection, will be awarded this spring, according to the *Massachusetts* Public Works Commission.

Canada plans highway through U. S. territory

A party of British Columbia surveyors will be in Washington state during the coming spring, planning the route of the proposed new highway which the province expects to build through United States territory as a means of eliminating costly grades in the trans-provincial roads north of the border.

A series of conferences on this project has been held between representatives of the British Columbia and Washington state governments, but before a definite understanding can be reached the plan must be submitted to the federal governments of the two countries for approval.

The proposal now under consideration is that Canada should be granted a 99-year lease of the right-of-way for the proposed road instead of having the territory ceded outright. Alternative plans, however, will be discussed when the physical plans for the highway are completed.

The road will connect the towns of Cascade and Patterson, two points just north of the Washington state border, and it would become an integral part of the trans-provincial system connecting Vancouver and other coastal cities with eastern British Columbia.

Calls housing "miserable failure"

During the last half-century the U. S. housing construction industry has "failed miserably" in providing well-built homes at reasonable prices, Senator R. E. Flanders of Vermont said last week in an extensive report to the joint congressional committee that has been investigating housing for the past several weeks.

He charged the industry with failure to replace depreciation and protect capital investment in housing. "Almost all home builders are inefficient, small-scale productive units, which would fail completely in an other important industry," the senator said. "Construction workers, too, usually insist on using handicraft methods until forced to do otherwise. The whole industry operates under a limitation of output rather than an expansionist outlook. As long as poor management, inefficient labor, and high costs of materials continue housing costs will remain high."

"If residential construction costs continue to rise, builders will rapidly price themselves out of the market and make a major contribution to . . . depression," the report predicts. "The market for home construction cannot be sustained indefinitely at present exhorbitant costs and price levels."

A materials distribution system that would not require the use of middlemen that never see the supplies, increased labor productivity, elimination of featherbedding, training of more young workers, improved building codes, and simplified financing methods are recommended improvements.

The report also calls for utilization of new and improved building materials, more advanced construction techniques, greater standization in the industry, greater research pertaining to housing work, and production of more homes.

Adequate appropriations to government agencies to aid in the needed improvements was also suggested, as were funds for the Federal Trade Commission and the Department of Justice to prosecute those who engage in restraint of trade were seen desirable.

It was also urged that the Housing and Home Finance Agency be charged by Congress with the responsibility of sponsoring and promoting the adoption by municipalities of a model building code with flexibility for local variations.

American Society of Civil Engineers starts 95th annual meeting in N. Y.

Richard E. Dougherty is seated as president at opening session—Four honorary memberships are awarded

Richard E. Dougherty, of White Plains, N. Y., vice-president in charge of improvement and development for the New York Central Railroad, took office as president; and honorary memberships were conferred on four distinguished members, as the American Society of Civil Engineers opened its 95th annual meeting in the Hotel Commodore, New York City, on Jan. 21.

Mr. Dougherty, a 1901 graduate of Columbia University, who has been in the service of the New York Central System since 1902, succeeds Edgar M. Hastings, chief engineer of the Richmond, Fredericksburg and Potomac Railroad.

Other new officers seated at opening sessions included: Vice-presidents, Carlton S. Proctor, New York, and J. W. Cunningham, Portland, Ore.; directors, William McK. Griffin, deputy chief engineer, Triborough Bridge and Tunnel Authority, New York; Edmund A. Prentis, New York, of the firm of Spencer, White and Prentis; Joel D. Justin, Philadelphia, of the firm of Justin and Courtney; Julian Hinds, general manager and chief engineer, Metropolitan Water District of Southern California, Los Angeles; Webster L. Benham, consulting engineer, Oklahoma City, and C. Glenn Cappel, of the W. Horace Williams Co., New Orleans.

Four honorary members

Honorary memberships were presented to the following:

John B. Challies, past president of the Engineering Institute of Canada and a leader in activities looking toward the advancement of the engineering profession in Canada. A graduate of the School of Practical Science at the University of Toronto in 1903, Mr. Challies spent 20 years in government hydraulic and power work for the Dominion government before joining the staff of the Shawinigan Water & Power Co., of which he is now vice president.

Hardy Cross, professor of civil engineering and chairman of the civil engineering department of Yale University. Prof. Cross is widely known for his development of methods for the application of successive approximations to determination of the actual flow distribution in a water supply network and to the analysis of rigid frames.

William H. McAlpine, chief engineer, Office of the Chief of Engineers, U. S. Army. A graduate of Massachusetts Institute of Technology in 1898, Mr. McAlpine, since 1902, has been engaged in river regulation and control work for the Corps of Engineers and on the design of dams and navigation facilities. In that period he had served on most of the boards of consultants set up by the Army Engineers and at present is a member of the board of consultants for the Panama Canal.

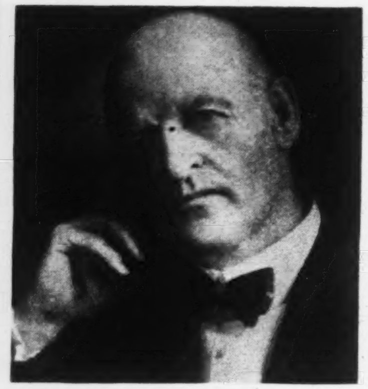
Karl Terzaghi, pioneer in the field of soil mechanics. Born in Czechoslovakia, Mr. Terzaghi prefaced his teaching career by 12 years of construction work in Austria, the Balkans and Rus-

(Continued on following page)

Richard E. Dougherty

Railroad engineer takes seat as new president of oldest engineering society.

***New Honorary Members**—Recipients of honorary memberships in the American Society of Civil Engineers were the four men above. They are: Top (left) John B. Challies and (right) Hardy Cross; lower (left) William H. McAlpine and (right) Karl Terzaghi.*



Charles H. Locher dies, heavy construction leader

Charles H. Locher, 85, nationally known contractor and engineer, died at his home at Glasgow, Va., Jan. 15.

A native of Balcony Falls, Va., Mr. Locher began active construction work in 1877 on the Shenandoah Valley Division of the Norfolk and Western Railroad. Over the next ten years, he was employed on railroad construction in Virginia, West Virginia, Kentucky and Pennsylvania.

In 1877 he became a partner in the contracting firm of C. R. Mason & Co., and for twelve years the several companies with which he was associated built portions of the Louisville Southern, Kentucky Union, and Norfolk & Western railroads, and a large part of the Chicago Drainage Canal. While working on the drainage canal, Mr. Locher invented an aerial dumping device for cableways, and later he invented the wagon-type drill which largely facilitated rock excavation.

From 1899 to 1904 he was a member of the firm of Winston & Co. & Locher. In 1904, Mr. Locher became associated with the firm of Grant Smith & Company, and from 1917 to 1923 he was construction manager for the Miami Conservancy District of Dayton, Ohio.

In 1925, after serving as a construction consultant on hydraulic fill dams in New York and Connecticut and as a member of a federal board investigating the feasibility and cost of the Columbia Basin project, he became associated with Frederick L. Cranford, New York subway contractor. During the four years that followed, this company did construction work amounting to $16,000,000 on New York City's subways.

In 1933 he became construction consultant for the Tennessee Valley Authority, serving in that post until his retirement in 1935. With A. J. Ackerman, he was co-author of *Construction Planning and Plant.*

Bill asks indefinite federal road aid

Three major bills pertaining to federal aid for highway const[illegible] of them seeking the indefinite extension of a $500,000,000 year[illegible] authorization—were introduced in Congress in early sessions last week.

Two of the measures, authorized by Congressman Cunningham of Iowa, chairman of the Roads Subcommittee of the House Public Works Committee, called for continuance of the present expenditures on highways authorized under the federal highway act of 1944.

The first H. R. 4867, would amend the road act of 1916 to authorize appropriations for continuing the postwar construction of highways in the sum of $500,000,000 for the fiscal year ending June 30, 1950, and for each fiscal year thereafter. No final termination date is mentioned in the bill.

The second, an almost exact parallel, would authorize similar appropriations for the fiscal year ending June 30, 1950, and for each of three successive fiscal years thereafter.

The 1944 act provides funds up to June 30, 1949.

Both of the new bills provide that the sums authorized for each fiscal year shall be available for expenditures as follows: 45 percent for projects on the federal aid highway system, 30 percent for projects on the principal secondary and feeder roads; and 25 percent for projects on the [illegible] federal aid highway system in urban [illegible]

The third measure (S. [illegible]) would provide $300,000,000 of [illegible] federal aid yearly for a period of two years after the June 30, 1949 date. The measure, introduced by Senator Revercomb, of West Virginia, would require that 50 percent of federal funds be spent on interstate systems.

◆

Approve $11 million work by Missouri Pacific RR.

The spending of $11,161,300 by the Missouri Pacific Railroad and subsidiaries for improvements during 1948 recently was authorized at St. Louis, Mo., by a U. S. district court.

The chief operating officer for the Missouri Pacific, Paul J. Neff, testified that the new improvements would largely consist of new rails, new bridges, grade and curve changes, and revisions.

Expenditures listed include: $7,632,540, for the Missouri Pacific and $3,529,000 for other subsidiaries.

ASCE opens annual New York meeting

(Continued from page 55)

sia. From 1916 to 1925 he taught at the Imperial Engineering School at Istanbul and at Roberts College, where his studies in soil mechanics began. There followed four years of teaching at M.I.T. and then nine years at the Technische Hochschule in Vienna before his return to this country to teach at Harvard. His pioneering in the field of soil mechanics was first brought to the attention of the civil engineering profession by a series of articles published in *Engineering News-Record* in 1925.

Awards listed

Other awards presented were:

Boris A. Bakhmeteff, Professor of Civil Engineering, Columbia University, and Dean of Civil Engineering William Allan, School of Technology, College of the City of New York, the Norman Medal, for their paper, "The Mechanism of Energy Loss in Fluid Friction."

Thomas R. Camp, Boston consulting engineer, the J. James R. Croes Medal for a paper, "Sedimentation and the Design of Settling Tanks."

R. F. Blanks and H. S. Meissner, of the U. S. Bureau of Reclamation office in Denver, the Thomas Fitch Rowland Prize for their paper, "Deterioration of Concrete Dams Due to Alkali-Aggregate Reaction."

Ross M. Riegel, head civil engineer, design department, Tennessee Valley Authority, Knoxville, the James Laurie Prize for his paper, "Structural Features of Hydraulic Structures."

F. L. Ehasz, structural design engineer, Sanderson and Porter, New York City, the Collingwood Prize for Juniors for his paper, "Structural Skew Plates."

A. L. Genter, Baltimore consulting engineer, the Rudolph Hering Medal for his paper, "Computing Coagulant Requirements in Sludge Conditioning."

Maurice L. Albertson, Associate Professor, Civil Engineering Department, Colorado A & M College, Fort Collins, Colorado, the J. C. Stevens Award for his discussion of a paper, "Evaporation from a Free Water Surface."

A. A. Kalinske, engineer with Infilco, Inc., Chicago, the Karl Emil Hilgard Prize for his paper, "Conversion of Kinetic to Potential Energy in Flow Expansions."

U. S. acts against building labor group as new union-employer activity begins

Carpenters' Union enjoined in Kansas, found unfair in Tennessee—Missouri court blocks anti-picketing statute

Actions by a federal court and the National Labor Relations Board last week were among the first to adversely affect a construction union. Expiration of many union-contractor agreements apparently was the signal for new demands by workingmen throughout the nation.

Developments included a decision of the Missouri State Supreme Court which threw out an entire section of a labor-control act passed by the 1947 legislature.

The Federal actions included issuance of a court injunction in the western district of Kansas against the AFL United Brotherhood of Carpenters and Joiners, and the AFL Building Trades Council, ordering them to cease interfering with the erection of prefabricated houses near Overland Park, Kan. The injunction was the second obtained under the Taft-Hartley law by the National Labor Relations Board—the first having been directed against a teamsters' union in Utica, N. Y.

The Kansas carpenters had called a strike and reportedly resorted to "other pressure" in an effort to induce Klassen & Hodgson, Inc., building contractors, not to do business with the Wadsworth Building Co., of Overland Park, which manufactured prefabricated units.

Meanwhile, an NLRB trial examiner at Chattanooga, Tenn., held for the first time that a union was guilty of an unfair labor practice. He found that a section of the carpenters union had committed a secondary boycott by requiring its members to stop working on a house alongside non-union employees of the contractor who held a flooring contract.

Missouri court action

In a unanimous opinion, the Missouri Supreme Court held unconstitutional the anti-picketing section of the Madison Labor Act, enacted by the general assembly last summer. The high court directed the release of Arthur A. Hunn and Melvin Lee Levan, St. Louis labor officials, who were held during tests of the new law.

The court did not pass on the legality of the entire law, confining its opinion to the section which relates to picketing of a place of business when no labor dispute exists between the picket and the owner of the business involved. The decision held that the state has no power to ban peaceful picketing by an individual on the sole ground that no labor dispute exists between the picket and the business place being picketed.

Other developments

Other labor developments during the week included:

The granting of a 15 cent an hour pay raise for about 5,000 construction workers at Louisville, Ky., in an agreement between the Louisville General Contractors Association and the AFL Building Trades Council.

In New Mexico, union carpenters and painters have announced that they will ask a new and higher wage scale during impending negotiations with contractors. Charles W. Parcell, official of the New Mexico State Council of Carpenters, said that new wages will go into effect in Albuquerque on February 2 and in the rest of the state on April 1, providing 20 to 25-cent raises for skilled workers.

Construction work on nearly $30,000,000 worth of projects in the Schenectady, N. Y., area was resumed following the end of a 5-day walkout by four AFL building trades unions. The 1,900 union members agreed to increases ranging from 12½ to 15 cents an hour, offered by the Schenectady Builders Exchange.

Organized state highway maintenance workers in Iowa recently served notice through their union officials that they will ask civil service status for all state employees from the 1949 Iowa legislature.

And in Austin, Tex., the secretary of state's office announced that it would strictly enforce provisions of a five-year-old law requiring labor organizations to file annual statements.

Okay $487 million military building

(*Continued from page 53*)

Field, Tex.; Hamilton Field, Calif.; Kearney Airfield, Neb.; Keesler Field, Miss.; Ft. Leavenworth, Kans.; Lowry Field, Colo.; MacDill Field, Fla.; Randolph Field, Tex.; San Antonio airfield, Tex.; Scott Field, Ill.

Of the Army work outside the continental U. S., the biggest authorizations are as follows: Harmon Field, Newfoundland, $12,000,000; Iceland, $10,000,000; Ladd Field, Alaska, $20,700,000; port facilities at Whittier, Alaska, $5,300,000; Ft. Richardson-Elmendorf Field, Alaska, $10,200,000; Adak Airfield, Aleutian Islands, $4,300,000; and Marianas Islands, $18,000,000.

Other army construction outside the country includes: Mile 26 Airport near Fairbanks, Alaska, $2,000,000; Ft. Yukon Airfield, Alaska, $4,200,000; Tripler Hospital, Hawaii, $3,500,000; Hickam Field in Hawaii, $2,200,000; Kadena Field, Okinawa, $3,700,000; Sukiran Base, Okinawa, $1,300,000; Ft. Davis, Canal Zone, $1,800,000; Ft. Buchanan, Puerto Rico, $1,300,000; Kindley Field, Bermuda, $2,400,000.

Much Navy work outside U. S.

Naval work is limited to slightly above $100,000,000 in the continental U. S., and $140,000,000 outside the country. It is further specified that not more than $69,800,000 can be appropriated in the 1948 fiscal year for work on the mainland, and not over $59,971,000 for construction at outlying bases.

Largest of the Navy's continental projects are: Naval Air Missle Test Center, Point Mugu, Calif, $34,520,000; Aeronautical Turbine Laboratory, Trenton, N. J., $26,750,000; White Sands, N. Mex., proving grounds, $9,000,000; and David Taylor Model Basin, Carderock, Md., $1,410,000.

Other mainland projects of the Navy authorized are: Aviation ordnance test station, Chincoteague, Va., $1,600,000; Inyokern, Calif. ordnance test station, $5,300,000; post-graduate school, Monterey, Calif., $2,500,000; electronics laboratory near San Diego, Calif., $2,600,000; and ordnance laboratory work at White Oak, Md., $2,300,000.

Huge program on Guam

Over $11,000,000 of construction at the Navy's operating base at Adak, Alaska, is authorized, as is $30,000,000 of construction at the naval medical center on Guam, plus $24,000,000 to complete Apra Harbor, and $14,000,000 to develop an ammunition depot. Other big jobs approved for Guam are: supplementary radio activity, $6,750,000; permanent communication facilities, $5,750,000; permanent storage buildings and supply facilities, $14,675,000; development of fleet facilities, $9,800,000; and a submarine base, $1,670,000.

Navy projects also include: radio station, Kodiak, Alaska, $2,200,000; water pumping station at Pearl Harbor, Hawaii, $3,575,000; and supplementary radio facilities at Wahiawa, Hawaii, $3,000,000.

HIGHLIGHTS OF MUNICIPAL DEVELOPMENTS

Chicago asks funds to enlarge sewer planning program—Kansas City announces broad city plan—Hartford, Conn., reorganizes water commission—Other city affairs

Chicago, Ill., officials said last week that the city would enlarge its sewer planning program from the present $60,000,000 to $91,000,000 if the Illinois Post War Planning Commission authorizes a state contribution of $88,000 to cover cost of planning additional sewers.

The state commission will meet at the end of January to act on the city's application.

Plans for the present $60,000,000 sewerage program, comprising six systems, are nearly one-third completed, and two contracts are already under construction. One of these covers the complete Addison Street system, and the other is for the first section of the Kostner Avenue system.

Construction of the city's new sewers is financed out of a $58,000,000 bond issue approved by voters in June, 1946.

During the week other U. S. cities announced further plans for sewage disposal systems.

Erie, Pa., said it had completed plans for a sanitary sewer on State St. which would be given priority over all other projects; and Boston, Mass., sought a way to dispose of refuse and make new land by converting South Bay Channel, from Dover Street to Massachusetts Avenue, into a dump to be reclaimed by filling for use as an industrial area. City officials estimated that use of the channel would save between $2,000,000 and $5,000,000 a year in disposal costs over the next five to ten years.

Other developments in the field included granting of permission by the Minnesota Water Pollution Control Board for Construction of a huge taconite plant at Beaver Bay, Minn., by the Reserve Mining Co. of Cleveland, Ohio. The commission approved discharge of tailings from the plant into Lake Superior on condition that the discharge would not discolor the water, affect fish life or human water supplies, or constitute a public nuisance.

The Texas City, Tex., Municipal Sewerage Lift Station sustained damages estimated at nearly $50,000 when children apparently dropped a lighted holiday firecracker into a sewer main through a manhole close to the station. The resulting explosion of accumulated sewer gases collapsed one wall and the roof of the lift station and injured one child slightly. The station had just been rebuilt after severe damage sustained in the chemical explosion disaster last April.

Reorganize water district

The Metropolitan District Commission of Hartford, Conn., completed a reorganization recently following the resignation of two of its members. Under the new setup, William A. O. Wurts, appointed district manager in November, will now head the district as chief executive, aided by Warren A. Gentner who was named deputy manager and chief engineer of the Water Bureau. Caleb Saville, who resigned as manager of the Water Bureau, will continue as consultant, as will Robert J. Ross, formerly Hartford city engineer. H. Irving Skilton, newly appointed Hartford city engineer, is now deputy manager of the district's public works bureau, and Alden Wells, formerly deputy manager, is chief engineer of that bureau.

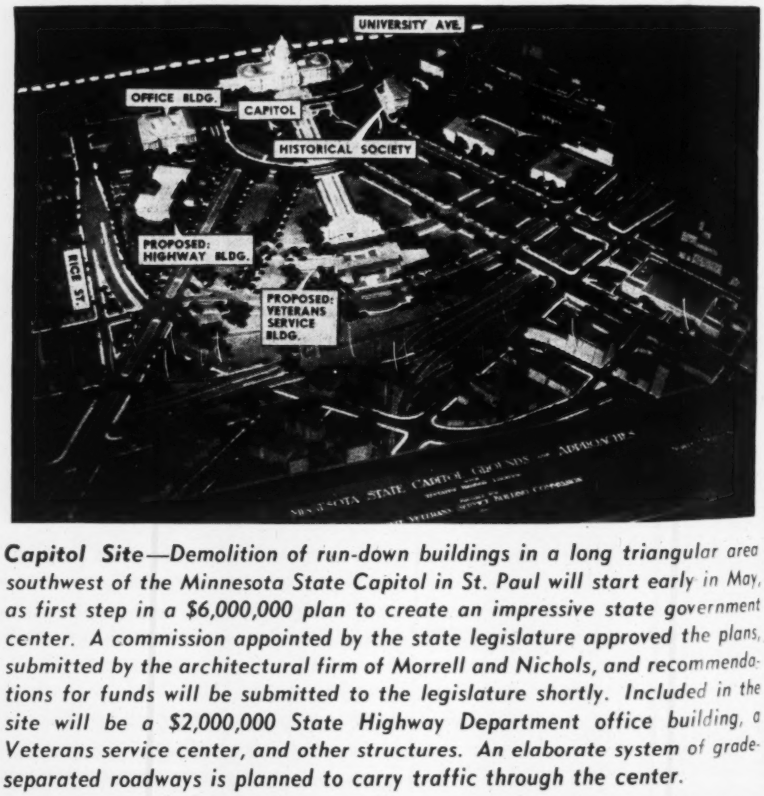
Cleveland, Ohio, began work on a five-mile-long tunnel to provide raw water for its planned Nottingham reservoir and filtration plant at a rate of 100 mgd. Work was started on the mile-and-a-half land section of the tunnel by Joseph Kalill, contractor on this $1,800,000 section. Merritt-Chapman & Scott Corp., holder of a $4,200,000 contract for the marine section, said it expects to begin preliminary work in about three weeks.

The entire Nottingham project is to cost an estimated $17,000,000 and is scheduled for completion in 1950.

Akron, Ohio, began its $2,500,000 water supply improvement program when the DeLuca Construction Co. started a $188,000 contract for laying cast concrete pipe in a 1,600-ft. long line to bring raw water from the Lake Rockwell pumping station to filter beds. The line will supplement the existing single line from the reservoir.

Kansas City plans

Kansas City, Mo., reported that it had plans well under way for a large-scale civic improvement program that will involve expenditure of between $13,000,000 and $15,000,000 of city, state and federal funds. Announced objectives of the program are to im-



Capitol Site—*Demolition of run-down buildings in a long triangular area southwest of the Minnesota State Capitol in St. Paul will start early in May, as first step in a $6,000,000 plan to create an impressive state government center. A commission appointed by the state legislature approved the plans, submitted by the architectural firm of Morrell and Nichols, and recommendations for funds will be submitted to the legislature shortly. Included in the site will be a $2,000,000 State Highway Department office building, a Veterans service center, and other structures. An elaborate system of grade-separated roadways is planned to carry traffic through the center.*

prove the city's physical plant, build the most urgently needed highways and structures, and at the same time hold to a minimum the competition with private industry for labor and materials.

Two of the largest planned projects —the southwest trafficway viaduct and a levee in the northeast section of the city—will be built with federal and state money. Bids for construction of the viaduct, estimated to cost $4,500,000, are expected to be called before July 1, and the levee project, to protect more than 4,000 acres for industrial development, will be up for bidding by the end of January.

One other project, a $2,240,000 job, is already under contract. This job will cover laying of a new water main from the city's Turkey Creek pumping station 7½ miles south to 75th and Holmes Sts., to provide an added supply of water on the south and east side of the city.

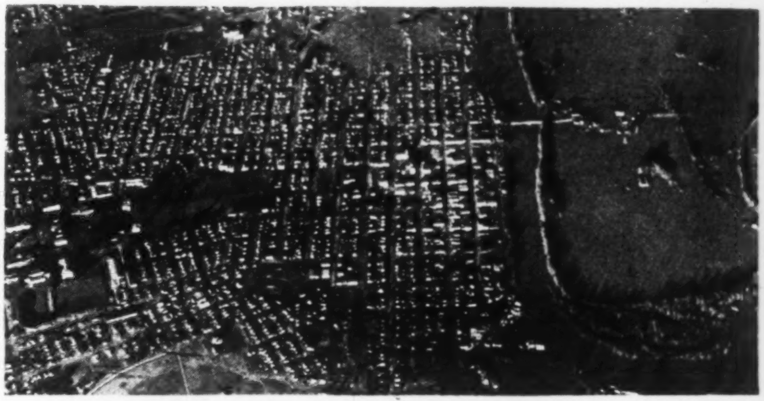
Lucas County (Toledo), Ohio, adopted a county residential building code designed to halt unregulated construction beyond the city limits. Drawn by Charles E. Hatch, Toledo consulting engineer, the code is patterned closely after the city's building code and those in effect in other Ohio counties, and is of the performance standards type.

Marion County (Indianapolis), Ind., adopted a planning and zoning program, taking advantage of a model planning and zoning law passed by the 1947 legislature. The county appointed a 10-member plan commission and a five member Board of Zoning Appeals, whose first task will be work on a new master plan for the county to regulate construction.

Uphold toll rights

The Missouri State Supreme Court has upheld the right of the City of St. Louis to impose tolls on vehicular traffic on the MacArthur Bridge. The action, reversing the decision of a lower court, saves the city about one million dollars in revenue that it gathers from motorists crossing the city-owned span.

The case arose after the arrest of Edward M. Cavanaugh, one of the officials of the Automobile Club of Missouri, who deliberately refused to pay the 10 cent toll on the bridge. Club members and other opponents of the toll contended that a 1906 ordinance calling for a bond issue for the construction of the bridge had provided that the span be "perpetually free." The state court held, however, that the city's right to impose tolls is vested in it by the city charter, and cannot be abandoned or surrendered.



***Wet Season**—The town of Corvallis, Ore., is almost entirely under water as January floods push the Willamette River out of its banks. At lower left is the campus of Oregon State College.*

Western Oregon floods cause heavy damage

Swollen by a 36-hour, 5-in. rainfall, the Willamette River and its tributaries in western Oregon went over their banks Jan. 5, causing damage estimated by Army Engineers at $12,000,000.

Streams in other areas along the coasts of Oregon and Washington also reached flood stage. Seven lives were lost in those floods, and damage to highways was said to be heavy.

Most serious losses were in the Springfield-Eugene area in the upper Willamette Valley, where engineers said that the maximum discharge of the Willamette River was larger than in the floods of 1926 and 1927.

◆

Retired officers chosen for municipal work

Capt. Alden K. Fogg, public works officer of the 11th Naval District, has been appointed city engineer for San Diego, Calif., effective on his retirement from the Navy Feb. 1. The position had been vacant since last July when Neal D. Smith, the former engineer, became assistant city manager. Russell A. Hall has been acting engineer during that period.

Captain Fogg has been on duty in San Diego since November, 1942, his responsibilities including direction of the $14,500,000 San Diego Aqueduct, built to supply added water for naval personnel.

Before his tour of duty in San Diego, Captain Fogg was superintending civil engineer for the Navy's Area No. 7, with headquarters in Seattle in charge of the Navy's extensive work in Alaska.

Col. Lyle Rosenberg, (ret.) Corps of Engineers, has been employed as city manager of Albuquerque, N. M., beginning his new duties about Feb. 1. Colonel Rosenberg was district engineer in Albuquerque for 18 months during the war.

Colonel Rosenberg, 47, is a native of Massachusetts, and was graduated from the University of California before entering West Point.

He later served as chief of the procurement division in the office of the Chief of Engineers, went overseas in 1944 to command a construction brigade, returned to the U. S. in 1945 and retired in 1946. Since his retirement he has been resident engineer at San Francisco for Sverdrup & Parcel, St. Louis, Mo., consulting engineers.

◆

Akron experiments with rust inhibitor

Addition of a rust inhibitor to salt used for de-icing streets is being tried experimentally in Akron, Ohio, upon the recommendation of the Goodyear Tire & Rubber Co. Akron has used common salt in ice control for many years due to the proximity of salt mines.

Experiments conducted by the Goodyear company indicate that a solution of 20 percent sodium chloride and 2 percent sodium chromate or dichromate considerably reduces the corrosion caused by common salt on the low-carbon steel used in automobile fenders. The tests also show that the chromite salts have a slight beneficial effect on tires, toughening both natural and synthetic rubber.

The engineering department of Akron is experimenting with the addition of one percent chromate salts, or 20 lb. per ton. Since this adds $1.20 to the cost per ton of salt for ice control, the engineering department said that only a very clear showing of benefits will justify the added cost.

Propose new commission to study Panama Canal

Creation of an Interoceanic Canals Commission to study increasing the capacity of the Panama Canal and other alternatives is proposed in a measure introduced in the House of Representatives last week.

The measure (H. R. 4833) would permit the President to appoint a nine-man commission, to study how the capacity of the Panama Canal might best be increased; how operation of the canal might best be improved; evaluation of the feasibility of construction of a new canal at some other location, and to make recommendations regarding how such a waterway might best be operated. In its work, the commission would be required to give careful consideration to the report recently submitted to Congress by the governor of the Canal Zone calling for conversion of the existing canal as a sea-level waterway (*ENR* Dec. 11, 1947, vol. p. 787).

A second measure, authorizing a review of the report made to the 72nd Congress some years ago on the possibility of building an interoceanic canal, was H. R. 4834, introduced by Congressman Hendricks of Florida. A third bill (H. R. 4835), also introduced by Mr. Hendricks, calls for construction of a canal across Nicaraguan territory.

◆

Col. C. F. Williams named N. Y. district engineer

Col. Charles F. Williams, for the last seven years deputy chief of staff of the U. S. First Army, will become New York District Engineer for the Corps of Engineers on Feb. 1, an Army announcement said last week.

Colonel Williams will succeed Col. William F. Heavey, who recently announced his retirement to become a consulting engineer to the New York City Department of Marine and Aviation (*ENR* Dec. 11, 1947, vol. p. 787). Colonel Heavey has headed the New York district since his return from overseas duty early in 1946.

Colonel Williams, a 1913 West Point graduate, was in charge of construction of Bonneville Dam from its inception until the summer of 1937, when he became senior instructor in the Command and General Staff School at Fort Leavenworth, Kan. He remained at the school until 1940, when he joined the First Army as Deputy Chief of Staff, and remained with that organization through its 2-year overseas assignment.

High costs may postpone Delaware River bridge

Plans to construct the $40,000,000 Memorial Bridge across the Delaware River near Wilmington, Del., may have to be abandoned temporarily because of the rapidly rising costs of materials and labor, state officials said last week. An alternative may be the construction of a 4-lane bridge instead of the 6-lane crossing that had been planned it was disclosed following a meeting of the State Highway Commission.

The possibility that the bridge will be temporarily abandoned came only two days after the first bids for actual construction had been opened. (*ENR* Jan. 15, vol. p. 81).

The lower of the two proposals was that of the Dravo Corporation of Pittsburgh which offered to construct the two main anchorages and two tower piers for the sum of $12.896.375. The second bid, from Merritt, Chapman & Scott, of New York City, called for an outlay of $13,338.359.

In a statement issued after bids were opened, department officials said "it is quite possible" that the project will have to be abandoned until conditions are stabilized.

MAJOR MEETINGS

Canadian Construction Association, 30th annual meeting, Chateau Frontenac. Quebec, Que., Jan. 25-28.

American Road Builders' Association, and its Divisions, annual meeting, Willard, Mayflower and Statler Hotels, Washington, D. C., Jan. 26-28.

National Crushed Stone Association, Netherlands Plaza Hotel, Cincinnati, Ohio, Jan. 26-28.

Construction Industries Association, Statler Hotel, Washington, D. C., Jan. 28.

Associated General Contractors of America, Inc., 29th annual convention, Adolphus and Parker Hotels, Dallas, Tex., Feb. 9-12.

Associated Equipment Distributors, 29th annual meeting, Edgewater Beach Hotel, Chicago, Ill., Feb. 15-19.

U. S. Conference of Mayors, annual conference, Waldorf-Astoria Hotel, New York, N. Y., Feb. 16-18.

National Association of Home Builders, Stevens and Congress Hotels, Chicago, Ill., Feb. 22-26.

American Concrete Institute, annual convention, Shirley-Savoy Hotel, Denver, Colo., Feb. 23-26.

Association of Highway Officials of North Atlantic States, 24th annual meeting, Hotel Traymore, Atlantic City, N. J., March 3-5.

Mississippi Valley Conference of State Highway Departments, Edgewater Beach Hotel, Chicago, Ill., March 11-13.

American Concrete Pipe Association, Hotel Roosevelt, New Orleans, La., March 12-13.

Chicago Technical Conference, Stevens Hotel, Chicago, Ill., March 22-24.

Buggs Island Dam bids far over estimates

Army engineers said last week that the lowest bid on additional construction of Buggs Island Dam on the Roanoke River in southwestern Virginia were nearly $4.000.000 over estimates, and that negotiations have started in an attempt to avoid readvertising the work.

The lowest bid—submitted by a 7-firm sombination including Morrison-Knudsen Co., Walsh Construction Co., Blythe Bros. Co., Ralph E. Mills, Peter Kiewit and Sons, Perini interests, and Henry Kaiser—was $15.460.000, as compared to an estimate of $11.740.000. Next lowest bid was for $16.430.390.

Buggs Island Dam is a $69.000.000 flood control-power-and-navigation project, to be built under jurisdiction of the Norfolk district of the Corps of Engineers. Much preliminary construction has been completed (*ENR* Dec. 18, 1947, vol. p. 835).

◆

Gen. D. A. D. Ogden heads Eniwetok Island command

Brig. Gen. David A. D. Ogden, wartime commander of the Third Engineer Special Brigade in the Southwest Pacific area, has been named island commander of the Eniwetok atomic test site, Army headquarters at Honolulu said last week. Lt. Gen. John E. Hull is overall commander of the tests and of Joint Task Force 7, under which Gen. Ogden will operate.

General Ogden, 50, is a 1918 West Point graduate and has been an engineering officer since his graduation. After long and varied service throughout the United States and in Trinidad, B.W.I., he joined engineer amphibian troops in 1942, taking command of the Third Engineer Amphibian Brigade. He was named commander of the special brigade in the southwest Pacific in 1944.

◆

Seek construction bids for Albany VA hospital

Plans and specifications for construction of the 1000-bed Veterans Hospital in Albany, N. Y., are now being distributed to general building construction firms throughout New York and adjoining states, through the New York district engineer's office of the Corps of Engineers.

Architect-engineers for the 14-story structure are Eggers & Higgins of New York City, and Green & James of Buffalo, N. Y.

OBITUARY

Edward G. Worth, 84, civil engineer who from 1913 to 1922 was surveyor general of Oregon, died at Salem, Ore., Jan. 2. Earlier he was employed by the federal river and harbor service and in 1904 was made superintendent of construction for the U. S. lighthouse service in Alaska. He was a graduate of the University of Oregon.

Walter F. Rosenwald, 65, engineer with the Minnesota highway department for 37 years, died in Minneapolis, Jan. 6.

Robert A. Irvin, 43, chief engineer in charge of construction on Guam for Robert & Co., Atlanta, Ga., died Dec. 22. Mr. Irvin had been associated with the company for 22 years. He served as a lieutenant colonel in the Army Air Forces.

Frederick H. Romer, 71, building contractor, died at St. Paul, Minn., Jan. 6. He was president of the F. H. Romer Building Construction Co., of St. Paul, and had built many of the larger buildings in that city.

Albert Zesiger, 79, retired chief engineer of the Cleveland, Ohio, Metropolitan Park Board, died Jan. 9. He was an 1896 graduate of Case Institute of Technology. He worked for Cleveland as a construction engineer and building inspector and later went to Columbus as chief engineer of bridges for the state highway department. He returned to Cleveland in February, 1925, to join the Metropolitan Park Board, retiring from that post Jan. 1, 1940, when he went to live in Oberlin.

Leo S. Stone, 60, for many years connected with the engineering department of Boston, Mass., died Jan. 12. A graduate of Massachusetts Institute of Technology, 1909, he was engaged on the design of many important Boston projects for 35 years.

Nicoll Floyd, Jr., president of Hubbard and Floyd, Inc., dealers in contractors' equipment, died in New York City, Jan. 18. He was a 1909 civil engineering graduate of Princeton University.

Miller Hallowes, 68, civil engineer with the Florida Road Department, died Dec. 24.

Thomas B. McQuesten, 62, former minister of Ontario's highway department died at Hamilton, Ont., Jan. 13. During his administration, he started highways which involved the outlay of some $200,000,000, including the dual highway from Gananoque to Brockville, Ont., and the "Queen Elizabeth Way".

Ashton Ramsay Peyton, 59, contracting engineer for the Virginia Bridge Co., for about 35 years before retirement, died in Birmingham, Ala., recently.

Lester F. Ellis, 62, Boston, Mass., civil engineer, died Jan. 4 in Lexington. He was a graduate of the Tufts College School of Engineering and became associated with the engineering firm of J. R. Worcester and Co., in Boston. He later became vice-president of Gilbert Small and Co., Boston.

Harry M. Steward, civil engineer, formerly a member of the engineering department of the Boston & Maine Railroad, died Jan. 4 in Medford, Mass.

George C. Ross, 68, depot engineer at the U. S. Engineers office, West Memphis, Ark., died Dec. 30. He was a civil engineering graduate of Beloit College in Wisconsin and had worked on the construction of the Mexican Central Railroad, and on locks and dams on the Ohio River.

Walter G. Zimmerman, 71, an 1898 graduate of the Massachusetts Institute of Technology, and contract manager of the American Bridge Co., Chicago, died in that city Jan. 13.

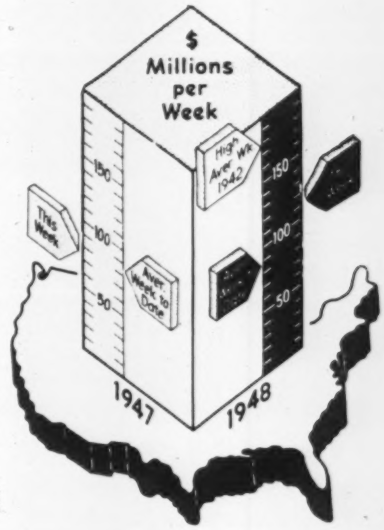
◆

William L. Malcolm dies; Cornell engineering head

William Lindsay Malcolm, 63, director of the school of civil engineering at Cornell University since 1938, died in Ithaca, N. Y., Jan. 18. Dr. Malcolm was a Canadian by birth and a civil engineering graduate of Queen's University, Kingston, Ont., in 1907. He obtained degrees of Master of Civil Engineering and Ph. D. from Cornell in 1934 and 1937, respectively. He was on the faculty of Queen's University, in 1907-08 as assistant professor of civil engineering and professor of municipal engineering. He designed and built the university's stadium, hockey rink and sanitary engineering building.

With the Canadian Army Engineers in the first world war, Dr. Malcolm attained the rank of lieutenant-colonel. A former city engineer of Guelph, Ont., he had also acted as a consultant on Canadian highway and building programs.

CONSTRUCTION ACTIVITY



As Reported this week to . . .
Engineering News-Record

CONTRACT VOLUME

Continental U. S. Only (Thousands of Dollars)

	Week of Jan. 22 1948	Cumulative 1948 (4 wks.)	1947 (4 wks.)
Federal	$10,955	$46,213	$17,854
State & Mun.	40,171	135,144	89,039
Total Public.	$51,126	$181,357	$106,893
Total Private	67,823	160,915	229,563
U. S. Total	**$118,949**	**$342,272**	**$336,456**

WHERE CONSTRUCTION ACTIVITY ORIGINATED THIS WEEK

Dollar Volume (Thousands)

Type of Work	This Week	Cumulative 1948 (4 wks.)	1947 (4 wks.)
Waterworks ...	$13,096	$16,695	$14,342
Sewerage	3,682	9,380	6,992
Bridges	2,953	16,937	8,093
Highways	10,535	51,273	31,024
Earthwork, Waterways	8,612	20,023	5,838
Buildings, Public	10,112	50,725	21,076
Industrial ...	13,240	31,162	64,265
Commercial .	47,782	115,997	155,237
Unclassified ...	8,937	30,140	29,589

NOTE: Minimum size projects included are: Waterworks and waterway projects, $28,000; other public works, $50,000; industrial buildings, $68,000; other buildings, $250,000.

NEW PRODUCTIVE CAPITAL

	Cumulative 1948 (4 wks.)	1947 (4 wks.)
NON-FEDERAL	$144,393	$84,270
Corporate Securities	75,620	1,720
State and Municipal	68,773	82,550
Total Capital........	**$144,393**	**$84,270**

ENR INDEX NUMBERS

Index Base	100	1913	1926
Construction Cost ..	Jan.'48	434.99	209.10
Building Cost	Jan.'48	326.92	176.72
Volume	Dec.'47	251	110

EDITORIALS

VOLUME 140 NUMBER 4

January 22, 1948

Warning From Washington

PROGRESSIVE ELEMENTS in the construction industry may well feel concerned over the growing feeling in Congress that governmental control and direction are the necessary means to lower costs and greater efficiency in building. The 185-page report of a joint Congressional subcommittee that has been investigating the industry contains fourteen proposals that constitute fair warning of what the members think the public wants. The whole current temper presents too close a similarity for comfort to that which preceded the crackdown on the public utility industry a decade ago. Then, the utilities chose to buck the trend and to defend practices that may well have been proper, but which the public nevertheless regarded as abuses. Today, when construction is under similar attack, manufacturers, contractors and labor unions might well look to correcting some of their practices that are widely regarded as not in the public interest. Otherwise the warning from Washington is that laws will be passed to correct them. And every law, no matter how well intentioned is an obstacle to progress and to the efficiency and lowered costs that the progressive elements in construction stand for.

Career-Service Appointment

APPOINTMENT of Mark D. Hollis to the post of assistant surgeon-general in charge of sanitary engineering activities for the U. S. Public Health Service is a happy choice. Mr. Hollis is a comparatively young civil engineer who has had a variety of experience in many phases of USPHS activity since 1932, both in investigation and administrative capacities. In addition, he served for five years as sanitary engineering director for the state of North Dakota. Thus he is not only trained to direct national activities, but he brings to his new post a sympathetic understanding of state and local problems; the latter viewpoint is important because the USPHS is engaged in many cooperative projects with state agencies. We feel confident that Mr. Hollis will prove to be an able successor to his former chief—Admiral John K. Hoskins—under whom he was schooled. To Admiral Hoskins, who is retiring after 3[illegible] years of service to the sanitary engineering field and who is now recuperating from a serious illness, we join with many others in saying, "Well Done."

One Place to Cut

THE PRESIDENT'S BUDGET includes $663,000,000 for civil works of the Army Engineers and $461,000,000 for the Bureau of Reclamation, or over a billion dollars for these two agencies combined. Much of this money is for work that is so far advanced as to require prompt and orderly completion, but a considerable part of it is for new work or for projects on which little money has been spent. Few, if any, of these new projects are so badly needed as to warrant their start at this time when everyone knows that they must compete with more urgent work for men and materials, thus helping to push construction costs higher. Consequently, these projects provide an excellent opportunity to put into practice the much discussed theory that public works should be used to stabilize construction, being expanded in bad times and curtailed in good times.

Adobe Extends Its Locale

FOR HUNDREDS OF YEARS adobe brick has been a successful building material in climates relatively free of rain and with plenty of sunshine. Now, as described in this issue, modern methods of manufacture, including scientific proportioning of the soil material and the use of an asphalt emulsion binder, extend the possibilities of use to climates where even prolonged rains are encountered. Still missing, however, is a means of economically drying the brick without dependence on sunshine. Mechanical drying offers a possibility, and herein resides an attractive challenge to the ingenuity of some construction man beset with the need of a new material in these days of scarcity and high cost.

Watch Those Costly Details

IN THESE DAYS of high construction costs many dollars can be saved by eliminating details or refinements. Concrete railings on highway bridges, for example, still are being designed with two or three horizontal bars and numerous posts requiring costly forms and complicating the work of placing concrete, when a single heavy bar and a few posts would look just as well, would cost less and probably would be safer. The same thing applies to the details of many other types of structures. Too much refinement in design is another source of higher costs. Odd span lengths or beam depths are used in structures to make theoretical savings that do not materialize. Engineers fall short of meeting their responsibilities if they do not take advantage of every opportunity to reduce costs without sacrifice of essential qualities—serviceability and satisfactory appearance.

Pioneer and Prophet

FEW MEN have commanded the respect or enjoyed the confidence of the leaders of construction as did Charles S. Hill whose death was recorded in these pages last week. For more than half a century, as a member of the editorial staff of this journal, he sat in their high councils, both public and private, aiding and often guiding the development of the technology, professional practices and business procedures that comprise the fabric of the construction industry today. A pioneer in the narrower sense of being contemporary with many significant changes, he gave the term real meaning by his unswerving belief that every new development must quickly be followed by another. An inveterate prophet of progress, he only looked backward to seek a lesson and never to indulge in nostalgia for the good old days.

This attitude was always reflected in his writings, and it was through them that his influence was most pronounced. Beginning with the Chicago Drainage Canal in the 1890's, he not only recorded the history of the growth of mechanized construction for the next 50 years, but he pioneered and developed an analytical style of technical writing that concentrated the spotlight on the significant features of a job in contrast to the wordy and rambling chronologies, too often, even yet, turned out by engineering writers. Blessed with an amazing memory, he complemented this trait with orderly and logical thinking. A striking example is the article "The Birth of Mechanized Construction" (*ENR* Dec. 12, 1946, vol. p. 786) that Hill wrote in his 79th year. A fitting finale to his skill as a pioneer and a prophet, in it he has memorialized the spirit of the progressive construction industry that he loved and lived for.

"Judge" Hill, as he was known far and wide because of his great dignity and wise and kindly nature, will be sorely missed. Yet the example he set of a belief that no possible advance of the construction art can exhaust its potentialities for ever-greater improvements is a legacy that all may share and thankfully cherish.

Potomac Basin Pollution Abatement

BEFORE most industries in the Potomac River basin install additional processing equipment, engineers in charge must now report to the top officials of their company concerning the possible effect of the new installation on pollution of the stream into which the waste is discharged. This was revealed by James S. Thayer, chief engineer of the Kelly-Springfield Tire and Rubber Co. at Cumberland, Md., and member of the industrial committee of the Interstate Commission on the Potomac River Basin at a recent meeting of that organization.

Mr. Thayer declared that "although in the past we considered the waters of a stream as free as air, industry in the Potomac Basin now appreciates its responsibility to the communities in the basin. Today top management must be satisfied that we are not increasing pollution of the waters receiving our wastes."

These views, which were given enthusiastic reception by the governmental and industrial members of the commission, represent the new view that industry is developing towards conservation of water resources. Further evidence of the sympathetic attitude of industries toward pollution abatement in the Potomac River basin is contained in a report that during recent months many new sampling stations have been established in the Potomac basin, and more than half of these were installed and are being operated by industries.

The manner in which industry in this area is shouldering its responsibilities not only reflects to the credit of industrial management but, more importantly, indicates the effectiveness with which an interstate pollution-control agency can operate. The youthful Interstate Commission on the Potomac River Basin is one of the best.

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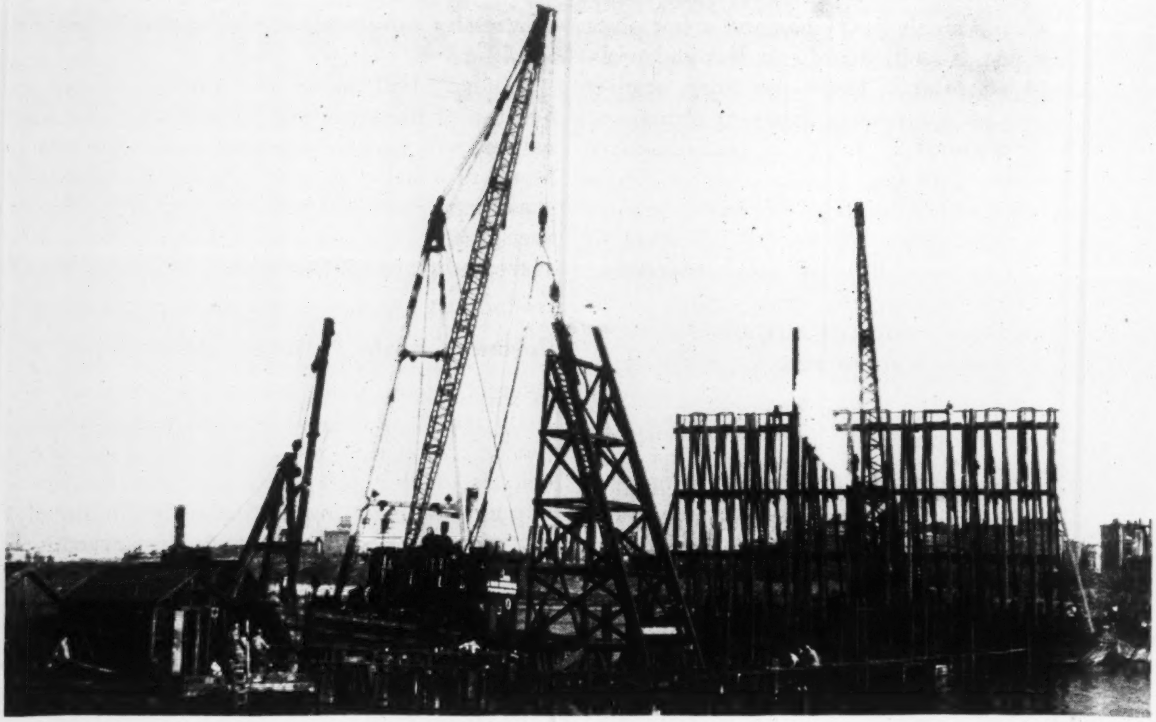

Fig. 1. A 13-lead rig was used to drive the 13 vertical piles of a bent from a single setting. Batter piles were driven from a simple frame that could be tilted to guide piles on a 1:3; 1:3¼ or 1:3½ batter.

Pier on 200-ft. Piles in N. Y. Harbor

Felix A. Ciampa

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New York 6, N. Y.

Contents in Brief**—*Built over 90 to 190 ft. of liquid mud on the New Jersey side of New York harbor, a 90x600 ft. pier on steel H-piles is being used for shore-to-ship transfer of loaded freight cars. The cars are shifted in cradles from the pier to any of four decks by a crane carried on supports independent of the pier.***

THE NEW PIER for Seatrain Lines, Inc., which was completed last summer marks a radical departure from traditional methods of pier construction at New York. It is supported on steel H-piles instead of the usual timber piles, and piles at the outer end were driven to the unprecedented depth of 200 ft. to reach firm bottom. Included within the pier, but structurally independent of it, is the pile supported framework that carries the large crane used to transfer loaded freight cars from track on the pier to ships operated by Seatrain Lines between New York and New Orleans and Texas City.

The new pier is 90 ft. wide and 600 ft. long, with a reinforced concrete deck supported on bents of 13 vertical 14-in. steel H-piles weighing 89 lb. per ft. Each bent is stiffened laterally by two batter piles. The H-pile bents are capped with a heavily reinforced concrete member 3 ft. by 3 ft. in section. Reinforced concrete girders 3 ft. 3 in. deep, including the 10-in. deck slab, span the 21 ft. 3 in. between supports.

The pier deck has four standard-gage railroad tracks, each rail being set directly over a 2-ft. wide beam that rests on one of the bearing piles. In addition to the eight beams under the rails, a typical section also has an 18-in. wide beam at the center and four beams outside the track.

The track beams have a recess 13 in. wide by 8½ in. deep to permit setting the track system flush with the top of the concrete deck slab. A 128-lb. per yd. groove rail is set flush with the deck surface so that trucks can travel readily over the deck to service the specially designed "Seatrain" ships.

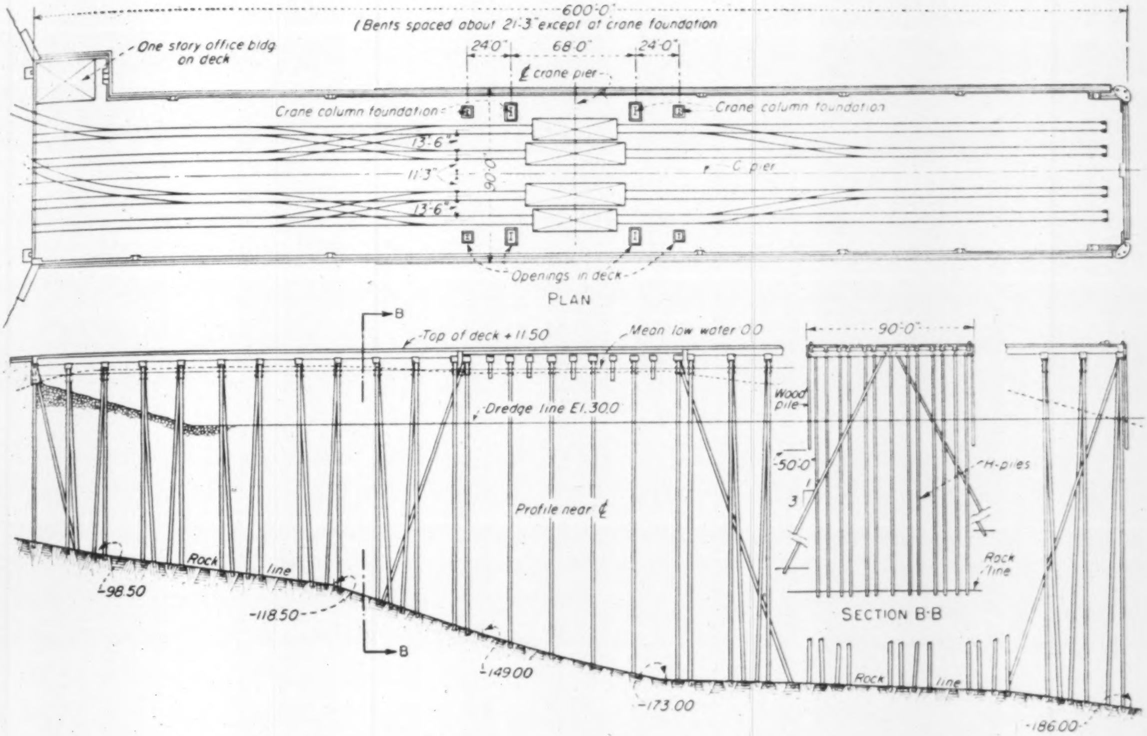

600'-0"
(Bents spaced about 21'-3" except at crane foundation
One story office bldg on deck
24'-0"
68'-0"
24'-0"
℄ crane pier
Crane column foundation
Crane column foundation
13'-6"
11'-3"
90'-0"
13'-6"
C pier
Openings in deck
PLAN
B
Top of deck +11.50
Mean low water 0.0
90'-0"
Dredge line El. 30.0
Wood pile
-50'-0"
H-piles
3
1
Profile near ℄
Rock line
Rock line
-98.50
-118.50
-149.00
-173.00
-186.00
SECTION B-B
Rock line
B

Fig. 2. H-piles driven as much as 200 ft. through silt to rock support the pier deck and crane structure. Batter piles stiffen the pier transversely at each bent, and in all directions at the crane area.

Near the center of the pier a large capacity fixed crane, resembling a hammer head, cantilevers some 75 ft. out beyond each side of the 90-ft. wide pier. Its function is to pick up loaded freight cars and transport them laterally to a ship alongside the dock where they are lowered through an open hatch at the center of the ship for distribution on four deck levels. Each deck has four tracks running the full length of the ship, which will accommodate about 100 freight cars.

Separate foundation for crane

The foundation for this crane is eight concrete piers on steel H-piles, these crane supports being separated by a gap of 9 in. all around from the surrounding pier deck. Because of the nature of the pier design, and the character of the load that the crane must handle, the eight individual pedestals are tied together beneath the pier deck by concrete braces, which are independent of the main pier structure. The purpose of freeing the crane from the pier is to prevent so-called whip action in the crane structure itself that might be caused by a collision of a ship with any portion of the pier.

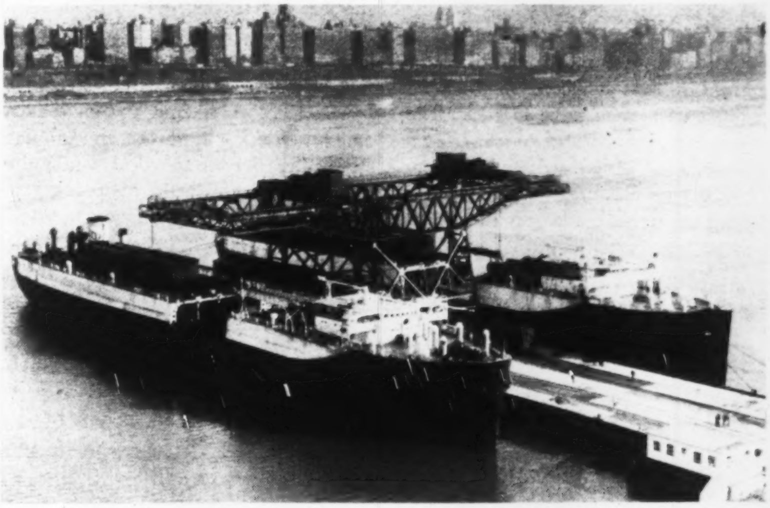


Fig. 3. Crane supported through, but entirely separate from the dock, loads and unloads filled freight cars on Seatrain Lines ships in New York harbor.

This type of pier and crane structure requires unusually good support. Conditions at the site available for the pier were far from good for the construction required. However, the area is typical of most of the Hudson River shoreline on the New Jersey side. From the foot of the Palisades to the center of the stream, the material overlying bedrock is a black, clayey silt mixed with organic matter. Its shearing value is small near the surface, but increases somewhat with depth as a result of age, pressure, and the earlier introduction of some sand into the mixture. Within

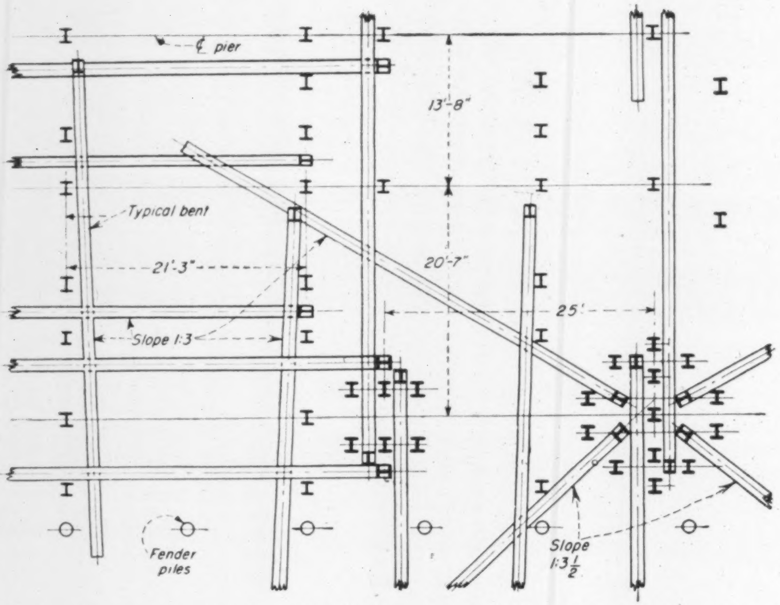


Fig. 4. Piles under half of a typical bent are shown at left. The clusters of piles at lower right support one corner of the transfer crane.

the limits of the pier the depth of this silt varied from 90 ft. at the inshore end to 190 ft. at the pierhead line. The area was a graveyard for old wooden scows, and silt had filled most of the area near shore to high-tide elevation.

It was recognized from the start that the crane support at the center section of the pier had to be constructed with steel piles to rock. The remaining inshore and outshore section were to be constructed as economically as possible.

Studies were made of three designs of typical pier decks. Each was analyzed as to cost, with the aid of contractors experienced in construction of piers and other waterfront structures. One study consisted of a concrete deck with steel stringers to support the tracks, the entire assembly being supported on wood caps and carried on spliced timber piles that were to support the structure by friction. A second design was a concrete deck supported by tubular steel piles driven to rock, while the third design consisted of a concrete deck on steel H-piles driven to rock.

With timber piles supporting the load by friction in the silty material, there is no reasonable assurance against future settlement as practically all timber piers on friction piles in the Hudson River silt have suffered settlement, sometimes over wide ranges. At the time construction was to be undertaken there also was considerable uncertainty as to when heavy timbers and wood piling could be secured.

Economical to use steel

Preliminary estimates indicated the cost of the steel H-pile design was about 5 percent greater than the timber pile structure. However, consideration of such factors as fire-safety, maintenance, settlement, permanence, and speed of construction indicated that the steel H-pile design was the best adapted to the existing conditions. H-piles could be driven with little effort and few blows, after the pile tip reached rock, insured a sufficient penetration into the disintegrated rock to give full end-bearing without special reinforcement or pile tips.

Because of the requirements for stability of the pier deck, and, particularly, for supports of the crane with wide fluctuations in pile stresses from plus to minus, 14-in. H-piles at 89 lb. per ft. were selected. These piles could withstand the stress of the unbraced column, a length of some 38 ft. below the pier cap even to silt.

The contractor elected to handle

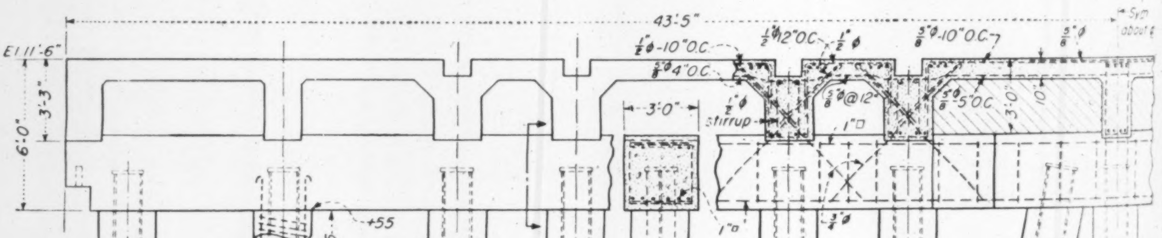


Fig. 5. Pier cap and section through pier deck. At outer end of the pier, piles are encased in concrete to below low **water and the section between cap and deck, shown cross-hatched above, is poured solid for greater rigidity.**

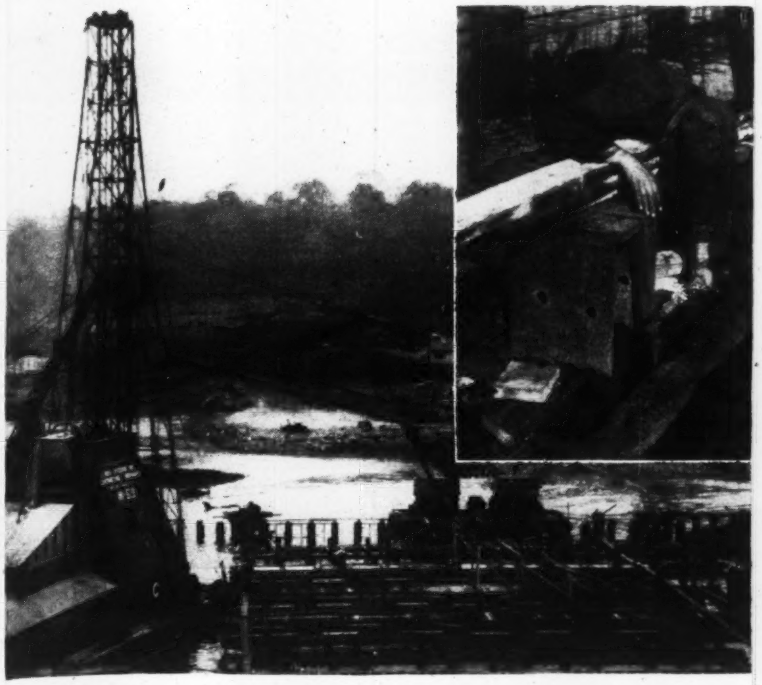


Fig. 6. All concrete was placed from a floating plant. Inset shows how forms are hung from pile tops. Reinforcing passes through holes burned in the piers.

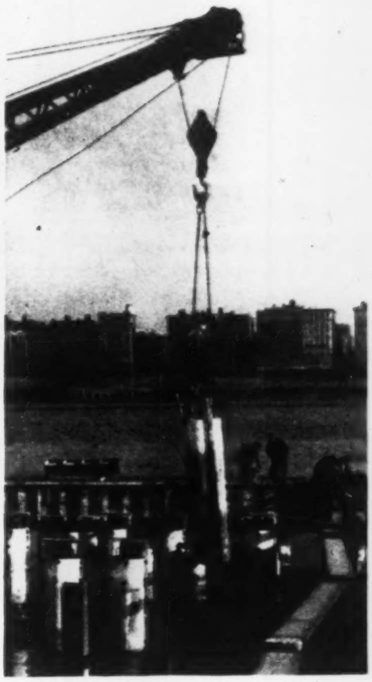


Fig. 7. Metal forms were used to place pile encasement concrete.

the entire construction of the pier with floating equipment. Preliminary work required on piles. fabrication of forms. and assembly of reinforcing steel. was done in the contractor's yard and materials moved by barges to the pier site.

Thirteen lead driver

Typical bents have 13 piles in each at somewhat irregular spacing to provide a pile under each of the tracks on the pier. Since 23 of the 29 H-pile bents are alike. the contractor devised an ingenious time-saving device to "spot" each of the piles in a bent at a single setting of the driving rig. Along one side of an old barge. 13 timber leads were rigged, spaced in conformity with plan requirements. This contraption, known colloquially as the "13 holer" had to be positioned only once along each bent line to locate exactly each of the 13 piles.

The leads were 45 ft. high. built of 6 x 12 in. timbers with back legs and bracing of 6 x 10's. The barge carried a boiler to supply steam for driving, as well as welder units for splicing long piles. A floating crane. on its own barge. handled piles into any of the 13 leads. This rig, with a 103 ft. boom. could handle piles up to 130 ft. long as a unit; where longer lengths were required a section was added to the pile by welding while the top of the first piece was stopped at barge-deck level. Some of the piles required that the hammer be set on the lower section to force it down to deck level. but in general the piles had to be held at that elevation for welding.

The single floating crane also handled the hammer for driving—the setting. welding and driving being scheduled to permit continuous work of all units. The carefully made preparations for handling the bearing piles resulted in rapid work on actual driving. with little difficulty encountered.

Transverse stability of the long pier structure depends to a large extent on battered piles. One pile at a 1 to 3 batter is used in each direction at each bent in a plane approximately that of the pile bent. In addition to these piles. six batter piles were driven at each of the four main foundations for the ship-to-shore-transfer crane. These were spread at about 60 deg. angles to cover all directions. To avoid interference with other piles. batters were 1 to 3. 1 to $3\frac{1}{4}$. or 1 to $3\frac{1}{2}$. the minimum number of variations possible to assure adequate clearance.

Here again the contractor developed his own equipment by building a simple wedge-shaped frame with a slope of 1 in $3\frac{1}{2}$. This frame. Fig. 1, was light enough that it could be handled by a moderate-sized floating derrick and. for driving. was supported on previously driven vertical piles. The frame could be shifted and oriented so that for driving of a batter the pile was laid in position on the sloping face. It was allowed to settle as far as it would under its own weight and then the driving hammer was laid on its side and allowed to follow the pile down the face of the frame. For other than 1 in $3\frac{1}{2}$ batter the vertical side of the wedge-shaped frame was tilted by blocking.

Concrete jackets at water line

Vertical and batter piles in the outer half of the pier foundation were encased in a 28-in. dia. concrete jacket to a depth of 3 ft. below mean low water. to give 4 in. minimum protection over the steel. The 19 piles in each of the four main crane foundations are all encased in a common concrete cap that extends to 3 ft. below mean low water. as are the 9 piles in each of the four supplemental foundations that support the outside frame of the crane. To keep the cap-

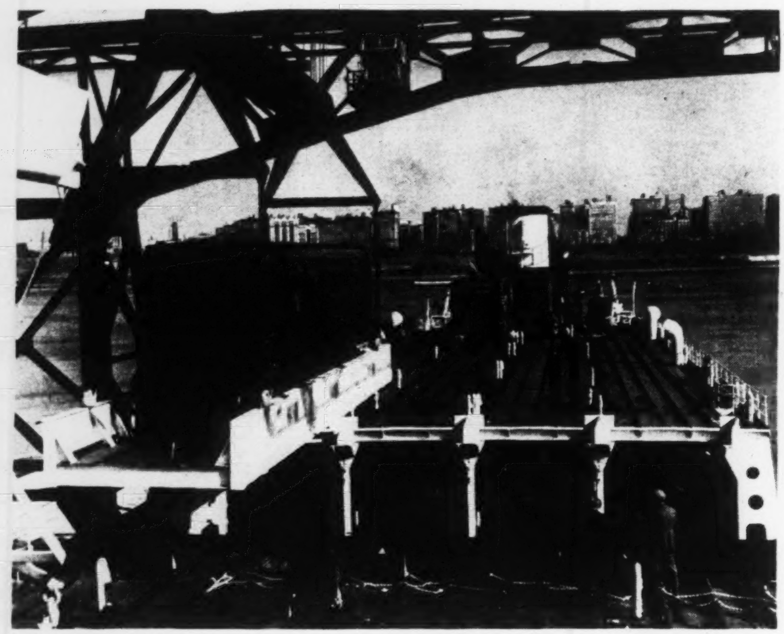


Fig. 8. Freight cars run over a cradle on the deck and are lifted to Seatrain ship by crane. About 100 cars can be placed on the four decks of the ship.

ital investment to a minimum, the remaining piles were installed without protective coating within the tide range.

For construction, forms for the pile-bent caps were supported on timbers, which were arranged alongside of the newly driven H-piles and supported by high-tensile wire ties, which terminated in a coil of wire that served as a connection for a coarse-threaded bolt. Heavy timbers on the completed pile-bent cap, in turn carried preassembled girder and slab forms. Reinforcing steel was assembled, so far as possible, in the contractor's yard and brought to the site on barges where it was placed by floating cranes.

Floating mixing plant

Concreting also was done from the water, using aggregate delivered by barges to a hopper and mixing plant on a scow. To speed the work, high-early-strength cement was used for all of the work. Concrete was raised in a tower hoist and chuted to position in the structure.

Protection for the pier consists of oak fender piles spaced 10 ft. 7½ in. apart with a continuous cap piece and a lower line of chocks spaced flush with the piles. Corner fendering is two rows of piles set on the radius of a circle.

A difficult part of the pier construction was providing a connection to the land side for rail and truck access. The end abutment consists of pairs of vertical master piles and bracing piles, battered outward on the water side, driven at 5 ft. 6 in. centers. To each master pile was welded a half section of shallow-web, 23-lb. per ft. sheetpile. Into the interlock of these sections sheetpiles of the same size were driven in a slight arc toward the river in a position that all interlocks would be under tension as the approach fill was made. Tops of the sheetmaster piles, batter piles, were embedded in a heavily reinforced concrete wall.

The purpose of this abutment was to retain the filled approach. Owing to a program of hasty placing of fill, ensuing slides and mud waves reduced the shearing value of the underlying silt to such an extent that several years must elapse before the filled approach can be completed by a planned and gradual deposition of new filling material. Meanwhile, a temporary connection of the pier with the more stable shore was accomplished with wood friction piles capped by heavy timbers and connected by timber stringers and timber flooring.

Design of the pier, including supervision of construction, was done by Harder, Barbato and Cian[illegible] under direction of the author. Clearing the site and dredging was performed by Merritt, Chapman & Scott Corp. and Great Lakes Dredge & Dock [illegible]

The pier was constructed by J. Rich Steers, Inc., under field supervision of Harold Lehmk[illegible]. The transfer crane was designed and erected by American Bridge Co.

Graham M. Brush, president of Seatrain Lines, Inc., directed the over-all design and construction, including the ships and special gear that are required to handle the loaded freight cars.

Los Angeles County Starts Anti-Smog Campaign

Los Angeles county has started a comprehensive anti-smog program to reduce and control sources of atmospheric contamination and thus improve air quality in this area.

The American Public Works Association reports that an air pollution authority has been appointed with broad powers to enforce anti-smog regulations throughout the county as well as inside the city of Los Angeles.

Like other metropolitan cities, Los Angeles' soot and smoke problem is aggravated by fumes from industries outside city jurisdiction. Experts agree that smog control is most effective if tackled on a county-wide or regional basis.

State legislation passed earlier this year made possible creation of the Los Angeles air-pollution authority. County-wide smoke control was also authorized by state action this year for Milwaukee and Pittsburgh.

The Los Angeles authority has powers to license all places that generate noxious fumes, excepting private homes. Licenses will be issued only if fume-eliminating equipment is installed. To curb home-created fumes, trash-burning schedules are being drawn up which will take advantage of regular daily wind shifts.

Revocation of operating licenses rather than fines will be the penalty for industrial violators of anti-smog regulations. In addition, a privately built incinerator designed to burn industrial wastes with a minimum of smoke is being tested by the city.

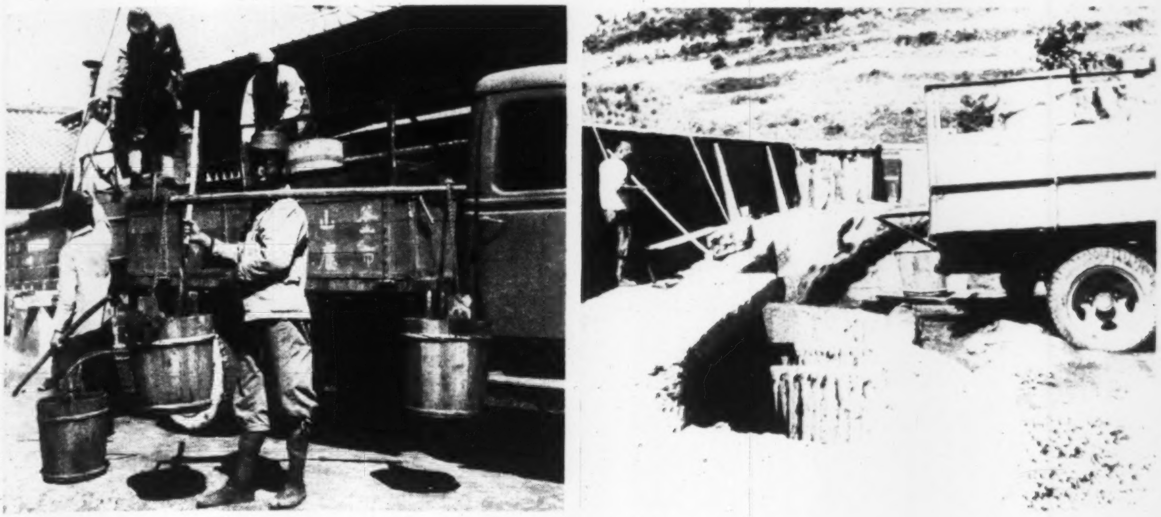


Fig. 1. Night-soil collectors empty buckets into tank trucks (left) which convey the material to decomposition tanks (right).

Sanitary Engineering—A Korean Episode

Phillip Z. Kirpich
Engineer, Knappen Engineering Co.
New York, N. Y.

***Contents in Brief**—After the entrance of American occupation forces, sanitary engineers played a dramatic role in the clean-up of Pusan, Korea. Not the least of their skills was employed in combating an outbreak of cholera, which called for unusual precautions in connection with water supply and waste disposal practices. Moreover, the breakdown of existing sanitary services during the war accentuated the problem of adapting local methods to bring about and maintain healthful environmental conditions. Public education coupled with vigorous demonstration led to a vast improvement in municipal sanitation.*

WHEREVER American military forces went during the last war, they built sanitary facilities and cleaned up their environment. Korea was no exception. In Pusan, the third largest city and first-class port terminus of the railroad leading to Seoul, the capital, and to Manchuria, an extensive clean-up campaign was initiated shortly after the entrance of the U. S. Army. This campaign and subsequent undertakings not only benefitted a grateful civilian population but also provided health protection for occupation troops.

In the main part of the city, people generally live in closely-placed Japanese-style houses, but on the fringe many live on steep hillsides that can be served neither by the pressures in the water distribution system nor by the collection vehicles of the sanitary services. Both conditions make maintenance of sanitary environment difficult.

Refugees add to problems

Moreover, a great influx of displaced persons and refugees, repatriated Koreans and dispossessed Japanese returning to their homeland, produced overcrowding and thus increased health hazards. The number of transients increased the population from 325,000 to 425,000 within a year.

Lastly, the sanitary services—below American standards to start with—had deteriorated during the final months of hostilities to almost complete ineffectiveness due to a shortage of vehicles and gasoline.

When military government units began to function, the following conditions prevailed: Of the 15 trucks normally assigned to refuse and night-soil collection, only seven were operating. Streets were littered with debris. Squatters were moving into vacant lots and erecting nondescript shanties, constituting health and fire hazards of the worst kind. With refuse collection inadequate and with widespread, uncontrolled dumping taking place, filth was accumulating everywhere and insect breeding was rife. The public water supply was able to furnish filtered but unchlorinated water for only a two-hour period daily. All Japanese employees of the city government, including engineering personal and heads of the

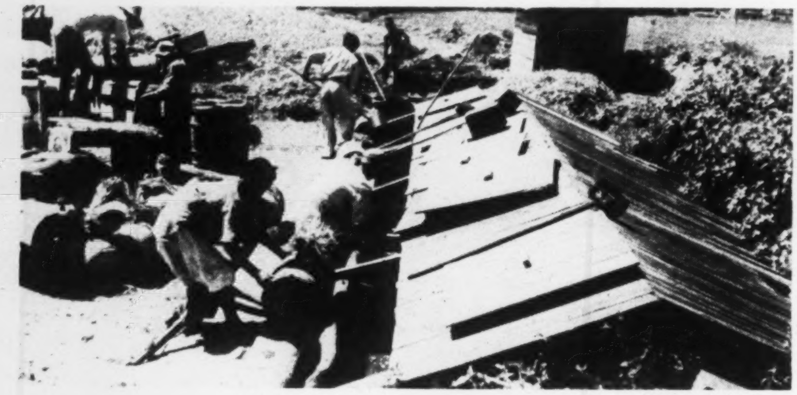


Fig. 2. Farmers take digested night soil from storage bins for field fertilization.

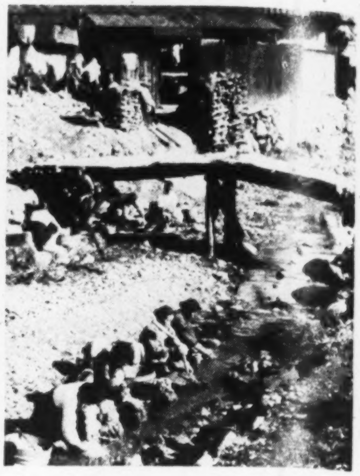


Fig. 3. Clothes are washed in contaminated streams.

Fig. 4. At the Pusan railroad station, "Clean-up Week" is advertised by means of a poster.

sanitation and water supply departments had been removed by order of the military governor.

Night-soil disposal practice

Use of night soil as fertilizer is universal in the Orient and is a primary reason for the high prevalence of intestinal and helminthic diseases.

Water-carriage systems for the removal of human wastes are not unknown in Pusan, but they are practically non-existent. The only flush toilets in Pusan—as far as is known—are those of the city hospital which discharge into a septic tank. Kitchen and washwater are discharged ordinarily into one-foot deep gutter-drains located on each side of the street, or into natural water-courses.

The night soil collection service operates as follows: Squads of laborers, armed with ladles and buckets, appear in a given district about once in two weeks. Under direction of a foreman, they empty privies in each house. Privy receptacles are built of concrete or masonry and are generally watertight. (For an extra charge a householder may have his privy scrubbed with a disinfectant.) A truck fitted with a watertight wood tank accompanies each squad. When full it is dispatched to the nearest night-soil disposal works and unloaded.

The largest of such works, located on the outskirts of the city in an agricultural area, consists of an unloading platform and a series of large concrete tanks. Following digestion during a period of about a month, night soil is conveyed by means of a pipe line several miles to another large tank located on the shore of a large tidal estuary. Here further decomposition takes place until the night soil appears not unlike well-digested sewage sludge.

A second pipe line is used to convey the digested matter to a small dock where boats take on cargoes for sale to farmers' cooperatives up-river. Local farmers obtain night soil at the disposal works for a small charge.

In one respect, at least, Korean sanitary methods surpass ours in that human fecal matter is never discharged into streams or natural bodies of water.

Refuse disposal and street cleaning

The per capita contribution of refuse and garbage at Pusan is far less than the corresponding amount for an American city. Moreover, the character of the refuse differs in that the proportion of organic matter is a good deal less and such items as tin cans are absent.

In refuse collection, use is made of a unique system of neighborhood organizations known as block associations. One of the responsibilities of each association head is to see that, on the appointed day, each householder cleans the gutter-drain in front of his house and deposits his refuse in a pile at a designated location. The city department of sanitation then carts the refuse to city dumps. Loading and unloading is by hand. The lack of such elementary equipment as dump trucks is a handicap wasteful of both manpower, which is plentiful, and vehicle time, which is scarce.

Insofar as it affects sanitation directly, the water system is noteworthy first for its inadequacy of supply, and second for the good quality of the water supplied.

Of the estimated population of 425,000, approximately 300,000 are served by the municipal system. The remaining 125,000 persons depend entirely on shallow wells. Even those residents served by the public system depend partly on such wells, as the public supply is turned on only five hours a day (on V-J Day only two hours supply was available.)

The Japanese left behind a well-equipped laboratory, but no trained Korean personnel were available to operate it. Periodic tests made at the 71st Station Hospital in Pusan showed the absence of B-Coli, even without chlorination.

The first clean-up campaign, which got underway in November, 1945, was for the primary purpose of re-

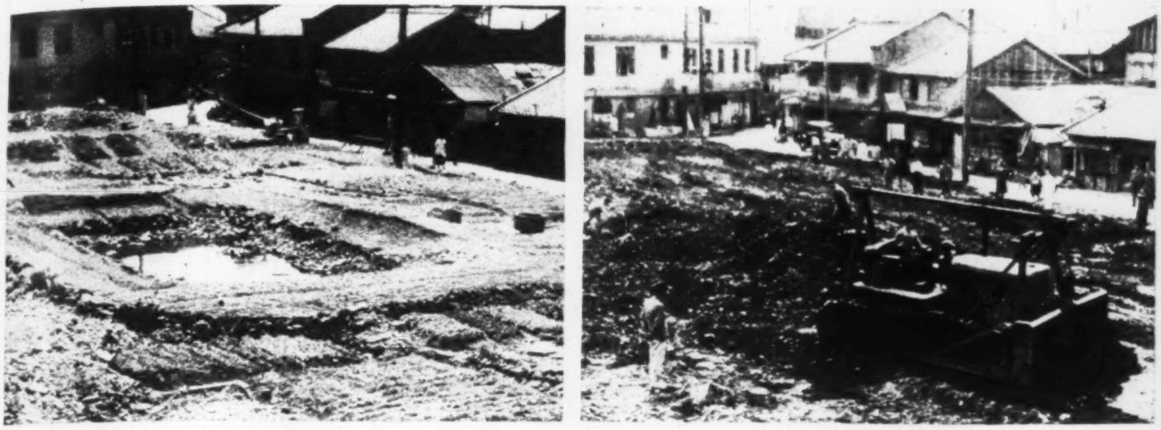


Fig. 5. Undrainable, mosquito-breeding, pockets (left) were filled and then leveled off with powerful bulldozers.

moving the gross accumulations of litter from the main streets. Special squads of laborers and trucks, supplementing the regular forces of the city sanitation department, were assigned to this task, the work being done under the direct supervision of military personnel.

Cleanup campaign effective

Another campaign of broader scope began a short time later and achieved the following results:

(1) The numbers of vehicles and personnel assigned to the Department of Sanitation were more than doubled, giving 82 laborers and 10 trucks assigned to refuse collection and street cleaning, and 96 laborers and 9 trucks assigned to night-soil collection. In addition, 8 animal-drawn carts were used.

(2) Large accumulations of putrefying filth and rubbish in vacant areas about the city were removed, and many lots were leveled to improve drainage and prevent insect breeding. This job was so large that native hand labor could not hope to achieve it in a reasonable time without the help of heavy equipment. Therefore, the services of the Engineering and Quartermaster troop units in the area were enlisted. A bulldozer, a clam-shell shovel and four Army dump trucks accomplished the job in about six weeks.

(3) The cooperation of the police was obtained in order to secure removal of unauthorized shacks and restaurants, which in many cases were erected directly upon piles of rubbish and debris in vacant lots.

(4) Approximately 300 surplus Japanese Army gasoline drums were obtained, marked, and placed in the streets as trash cans. At the same time, hundreds of sections of concrete sewer pipe which had been placed about the city as water containers to assist in combating fires from incendiary bombs, were removed. Used as trash cans these pipes had become great nuisances as they were too heavy to empty.

(5) Publicity campaigns utilizing posters, the press and the radio were organized. Special sanitary inspectors were hired and conferences were held to secure police cooperation in the enforcement of sanitary laws and regulations. Under Japanese rule, inspections as well as enforcement—in fact, all public health matters—had been a police function. Under U. S. administration separate public health departments, at national, prefectural and local levels were set up.

An outbreak of cholera

On May 22, 1946, despite strict quarantine regulations being practiced in admitting ships and refugees into the port, a case of cholera got ashore from a ship arriving from China. Thereafter cholera spread rapidly. There is no doubt that the unremitting and strenuous efforts on the part of all concerned, both American military and Korean civilian personnel in the area, prevented the occurrence, but not the terror and dread, of a major epidemic. In August 1946, the epidemic was over. In the Pusan area about five hundred cases, nearly half of them fatal, occurred.

While a complete history of the epidemic cannot be given here, some of the sanitary engineering problems will be discussed. With water likely to be one of the chief modes of transmission, the shallow wells in and near quarantined areas were immediately placed "off limits" as were running streams, the favorite place for washing clothes. These orders were enforced by troops and native police.

Chlorine dosage increased

Chlorine disinfection of the public water supply, which had been started a few weeks prior to the outbreak, was intensified. Supplies of liquid chlorine and hypochlorite powder were rushed from Seoul and other points. The dosage was stepped up in some cases to 4 ppm. Soldiers equipped with chlorine comparators were dispatched to each water treatment plant with instructions to maintain chlorine dosages that would give residuals of at least 2.0 ppm. at the plant. Moreover, Korean plant operators were instructed in the use of comparators, after which soldier supervision became unnecessary.

As the capacities of the gas chlorinators, which were of a pulsating type of Japanese manufacture, were greatly exceeded by the required dosages, and as additional machines were unobtainable, improvised chlorinators were made and operated successfully. An important reason requiring use of high chlorine residuals was the fact that with only five hours of pressure available in the system daily, the negative pressures during the remaining 19 hours created great danger of entry of con-

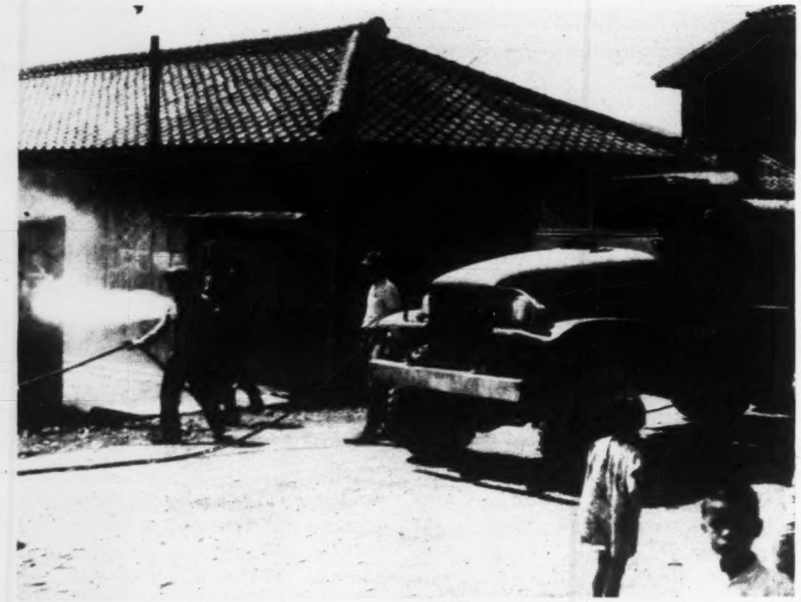


Fig. 6. DDT solutions were applied to native dwellings with U. S. Army power sprays.

tamination by means of back siphonage. One of the quarantined areas, which was at a high elevation, was not served with adequate supplies because of high drafts in lower areas. Special valving arrangements were worked out to insure sufficient supplies in the area and thus to assist in discouraging use of well water.

Quarantined-area wastes disinfected

Discharges from cholera victims are an explosive means of transmitting the infection. As all persons within the quarantined areas were potential carriers, this meant that all night soil and refuse from these areas could not be removed by the usual method. Burial or burning within the quarantined area was considered first, but due to the large volumes of wastes, this idea was discarded as impractical. Instead, it was decided to follow the usual methods for removal of night soil and refuse. In addition, the waste matter would be thoroughly disinfected before transportation out of the quarantined area, while trash would be taken out in tightly-closed trucks. Then, the disinfected night soil would be disposed of by burial at an isolated spot outside the city and the trash would be burned.

Before the sanitation department laborers, among whom were several women, could be induced to enter the cholera area to carry out this work, they were given two cholera immunization shots, and were promised a special bonus consisting of a pint of "sake" (rice wine) per day. This, it was learned, was the usual Korean custom under such circumstances.

Disinfection was accomplished by adding sufficient cresol to form a 2 percent solution within the tank truck, which was required to stand a full hour before leaving the quarantined area. During this time the tank truck was sprayed with both cresol and DDT, as were the privies in each house.

Dwellings sprayed with DDT

An ambitious program of spraying the entire city with DDT was launched at this time. This program, planned several months before, was given impetus by the cholera epidemic. Using Korean laborers of the sanitation department, under the overall direction of the writer, and with equipment and technical advice furnished by the 183rd Malaria Control Unit and the 220th Malaria Survey Unit, commanded respectively by Capt. William T. Blanchard and Capt. James Forbes, both of the Sanitary Corps, every dwelling and public building in Pusan was sprayed inside and out.

It is estimated that 40,000 dwellings and buildings were sprayed during a period of four months. In addition, the railroad station, the refugee compounds, theaters and other public places and trolley cars were sprayed once in two weeks. The two city dumps and all sanitation vehicles were sprayed once a week.

In addition to Captains Blanchard, Forbes and the writer, Capt. John D. McDonald, also of the Sanitary Corps, was active in tackling the problems of sanitation in the Pusan area. Capt. McDonald was a representative of the chief engineer, XXIV Corps and did much to secure emergency repairs to equipment on the city water system.

Minneapolis Finances Prefab Housing

Minneapolis recently became the only major U. S. city other than New York to finance a public rental housing project entirely with municipal funds.

The National Association of Housing Officials reports that the city has sold a $2 million emergency housing bond issue and contracts already have been awarded for construction of 107 prefabricated units.

The dwellings will be erected on tax-delinquent land. Single family units will number 147, to cost $3,643 each. Ten two-family duplexes will be built at a cost of $10,300 apiece. The houses are expected to be ready early this year.

Hardship studies will be made by the city welfare board to determine which families will get prefab rental assignments. Number of children and present cramped living conditions will be the main criteria.

Providence, R. I., Yonkers, N. Y., cities in Massachusetts and elsewhere have given municipal funds for housing, but not without considerable state, federal or private aid. Providence has provided $850,000 to be supplemented by a $1.65 million loan.

Until the Minneapolis action, New York was the only city to finance public housing solely with city funds. Two New York projects costing over $2.5 million have been completed and two projects totaling 1,130 units are under construction. Approval has been given to six more projects of 5,768 units to cost an estimated $[illegible] million.

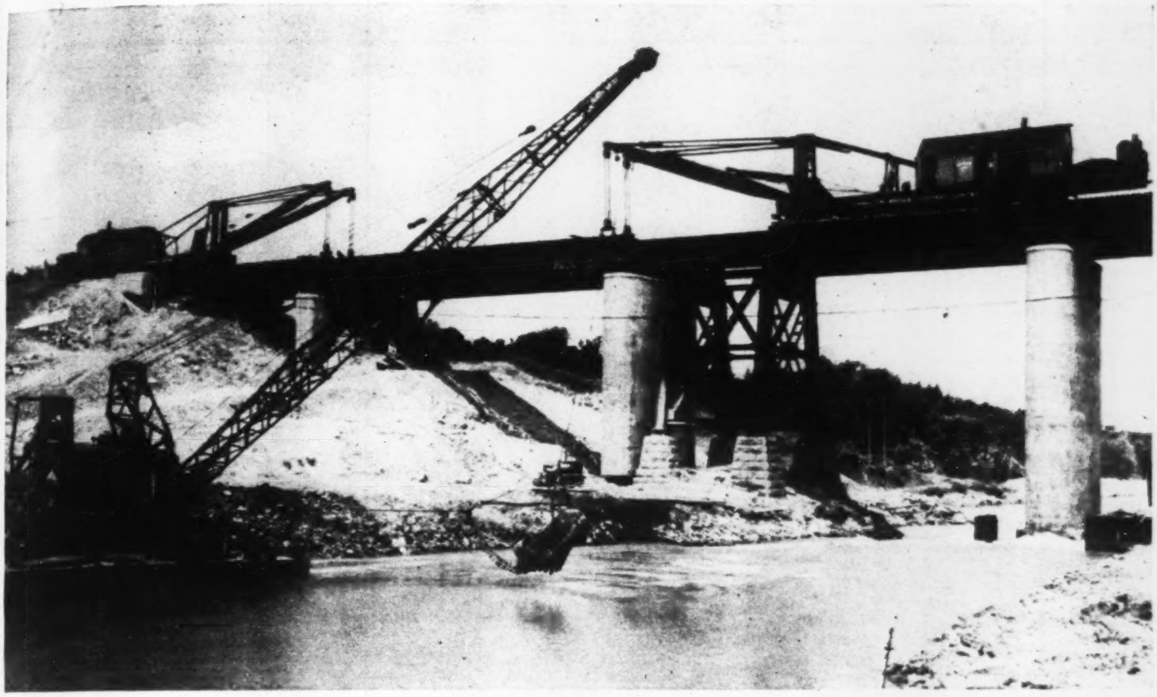


Fig. 1. Derricks shift girders to support on piers built by encasing H-piles in form then filling with aggregate and grout.

New Deep Piers Save Old Bridge

Norman S. Bateman
Chief Engineer, C. A. Pitts General Contractor, Ltd.
Toronto, Ont.

***Contents in Brief**—Replacing a substructure on spread footings was accomplished by driving H piles and pipe piles to good strata and extending them to near bridge-seat elevation by splicing after driving under the existing superstructure. Piles were encased with concrete made by filling sheetpile cofferdams below ground and conventional forms above ground with dry stone aggregate and adding grout forced in under pressure. For one pier, the section above ground was encased ahead of the lower section and load transferred to it before the excavating below an old footing.*

SWIFT WATER, location adjacent to existing piers, subsurface obstruction from earlier bridges and other physical obstacles made conventional pier design impractical and normal construction difficult for a new substructure to carry an important double-track line of the Canadian National Railway near St. Catharines, Ont., in the Niagara area. The difficulties were overcome by use of long steel piles protected concrete made by grouting a dry stone encasement.

An unusual cofferdam was necessary for building one pier in the channel where the water is very swift. Concrete for one pier was started in the middle and built first up, then down.

The work was made necessary by extensive channel enlargement below the DeCew Falls plant of the Hydro-Electric Power Commission of Ontario and is needed to accommodate an increase in discharge from 4,500 cfs. to excess of 9,500 cfs. This added water became available following changing of the course of certain streams so that instead of flowing north into James Bay, they are now diverted into the Great Lakes above Niagara. The water is reused through an enlarged development at DeCew Falls, a part of the Niagara system, where a 265-ft. head has long existed. By widening and deepening the discharge channel the tail-race channel characteristics of the plant have been substantially improved. A description of ingenious methods developed for moving sticky mud in connection with the channel enlargement appeared in *ENR*, Oct. 31, 1946, vol. p. 587.

The existing deck-plate girder bridge, which had three 100-ft. and one 65-ft. span, plus two short spans over tower bents, was capable of carrying Cooper's E-60 loading, adequate, with maintenance, for current

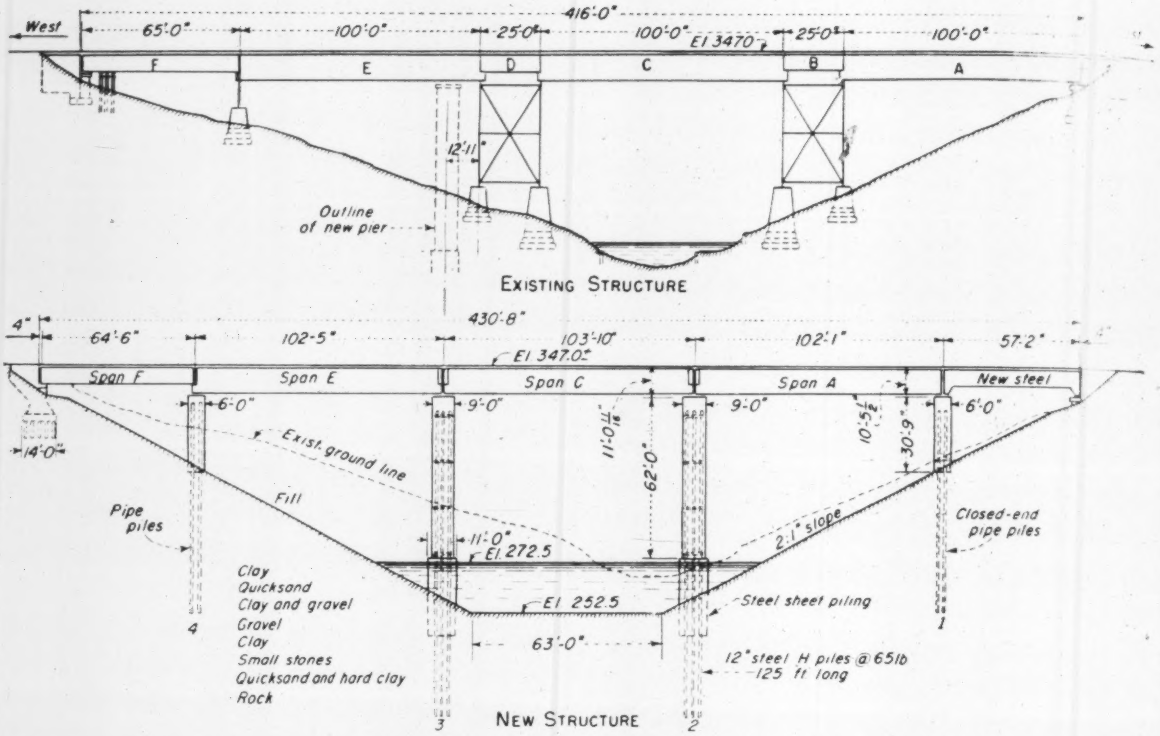

West
416'-0"
65'-0"
100'-0"
25'-0"
100'-0"
El 347.0
25'-0"
100'-0"
F
E
D
C
B
A
12'-11"
Outline of new pier
EXISTING STRUCTURE
4"
430'-8"
64'-6"
102-5"
103'-10"
102'-1"
57-2"
El 347.0±
Span F
Span E
Span C
Span A
New steel
6'-0"
9'-0"
9'-0"
6'-0"
14'-0"
11'-0¼"
62'-0"
10'-5½"
30'-9"
Exist. ground line
Fill
Pipe piles
11'-0"
El 272.5
2:1 slope
Closed-end pipe piles
Clay
Quicksand
Clay and gravel
Gravel
Clay
Small stones
Quicksand and hard clay
Rock
El 252.5
Steel sheet piling
63'-0"
12" steel H piles @ 65 lb 125 ft long
4
3
2
1
NEW STRUCTURE

Fig. 2. The superstructure of the old bridge is utilized almost completely in the new structure without the expense of a temporary crossing or delay to traffic. Removal of the old supports was done after the load was shifted to the new piers.

traffic. Independent pairs of girders supported each line of the track.

The bridge was on a long tangent at the tail-race crossing, and it was not desirable, from an operating standpoint, to introduce curves into the lines as would be necessary if a new bridge were built. Also, due to serious shortage of steel, as well as its high cost, it was desirable to utilize the existing structure to the greatest extent possible.

Masonry piers of the old substructure rest on spread footings, which have settled some over the years, so that it was desirable to carry new supports to deeply underlying rock, or at least to virtual refusal of the driven piles. Utilizing the existing structure required placing Pier 2 (Fig. 2) in the old channel where water had a velocity of 10 ft. per sec., which would be further increased by a construction cofferdam. The new Pier 3 would be immediately adjacent to and extend some 40 ft. below the existing supports for one of the tower bents. Vibrations from frequent passage of heavy trains added to the foundation construction difficulties as did the fact that old masonry from earlier culvert and bridge structures at the site left debris difficult to penetrate.

Pile piers encased in concrete

The design for the bridge, prepared by C. P. Disney, then engineer of bridges, Central Region, for Canadian National Railways, was made to overcome these difficulties. Long steel piles that extended from hardpan to near the bridge seat were planned for the support. By driving the piles in short lengths and welding pieces on as required, the new substructure was built up under the existing bridge. After driving, the piles were encased in concrete made by packing around them with dry stone and then forcing in grout to complete the piers.

Since these were essentially pile piers, merely encased in concrete, they could be made slender all the way to the bottom, thus reducing substantially the weight that is carried by the piles. The concrete also serves as structural stiffening for the piles.

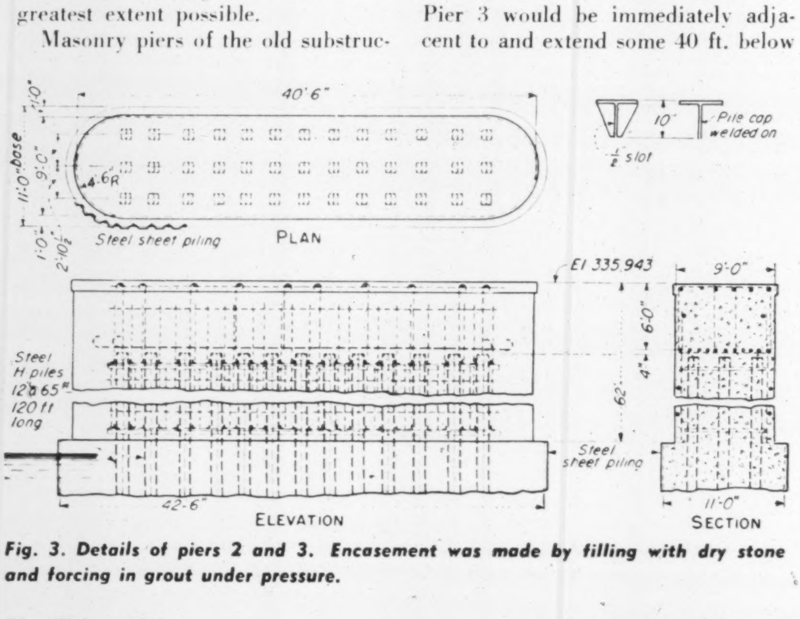

40'6"
1'-0"
9'-0"
11'-0" base
4-6R
1'-0"
2'-10½"
Steel sheet piling
PLAN
10"
Pile cap welded on
½ slot
El 335.943
9'-0"
6'-0"
4"
62'
Steel H piles 12@65# 120 ft long
Steel sheet piling
42'-6"
ELEVATION
11'-0"
SECTION

Fig. 3. Details of piers 2 and 3. Encasement was made by filling with dry stone and forcing in grout under pressure.

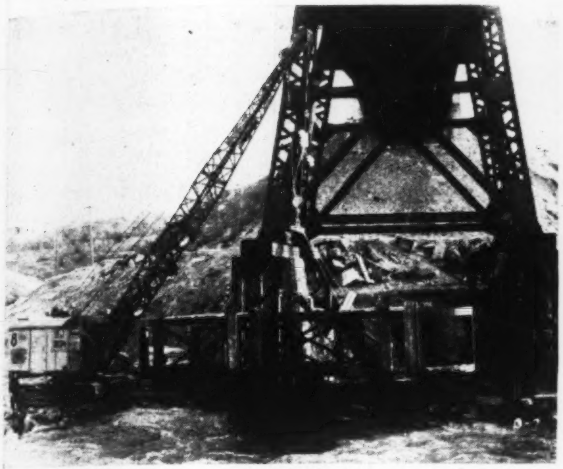


Fig. 4. A cofferdam in swift water was built around a structural frame supported from the existing bridge. Long sheetpiles were started through the interlocks of the short pieces.

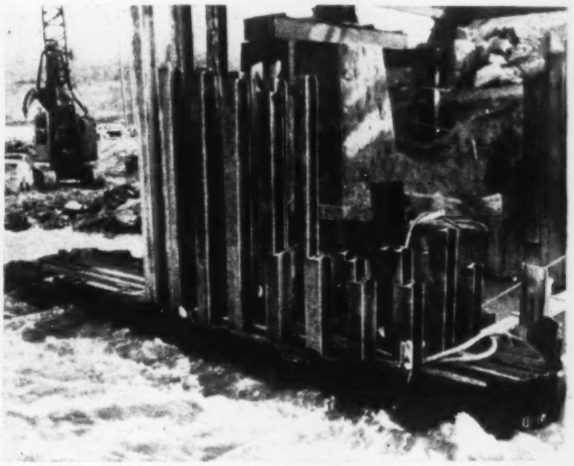


Fig. 5. The structural frame around which the sheet piles were driven also served to hold guides for positioning H-piles. Piles were later extended upward to 6 ft. below the bridge seat.

eliminating the usual heavy bracing.

The principal piers are of two major designs, and methods of construction are substantially different for each of them. Construction of a conventional support at Pier 2 would have required a large water-tight cofferdam, braced and pumped-out to a depth of 30 ft., or more, then piles driven for support. The design devised by Mr. Disney contemplated driving shallow-arched interlocking sheetpiles along the neat lines of the finished pier to well below the bottom of the new channel; it required that the cofferdam be excavated, but not pumped out, and steel H-piles driven to refusal with their tops extended upward to within 6 ft. of the bridge seat.

It will be noted that Pier 2 goes deeply below the existing foundation so that special methods of construction were necessary in the very swift water. Of first importance was prevention of any possible subsidence of the channel-side foundations of the old bridge. Such movement was forestalled by driving bearing piles to firm ground and then installing a grillage under the tower legs, Fig. 4. Next, a line of sheetpiles was driven along the channel line and tied back to the bank. The underwater area at the pier site was cleared of all solid debris that could be picked up with an orange-peel bucket handled by a crane.

Cofferdam in swift water

Building a cofferdam 11 ft. wide by 42 ft. 6 in. long in water having a velocity of 9 mph. presented a problem that required unique methods to overcome. A two-ring steel template for the cofferdam was framed on shore. It was rigidly braced to provide a firm guide for the sheetpiles, while cross bracing inside served as guides for the H-piles driven for bearing. Outside the template frame, short pieces of steel sheetpiling were fastened to serve as guides for the first long sheetpiles, which would be driven down to hold the template.

The existing bridge superstructure was a hindrance to the construction, but since it was there it was utilized effectively in building the cofferdam. To the assembled template, cables were fastened that would swing the frame under the bridge at about the top of the water. A crane picked up the template and set it into position, letting it hang under the bridge from the cables. Horizontal cables, with a turnbuckle in each for adjustment, were used to position the template.

The two-ring frame was supported on the vertical cables slightly above the water line until a sufficient number of long sheetpiles were driven to support it against the rush of the current. The frame was then lowered to its permanent position with the top ring slightly below the water line, and

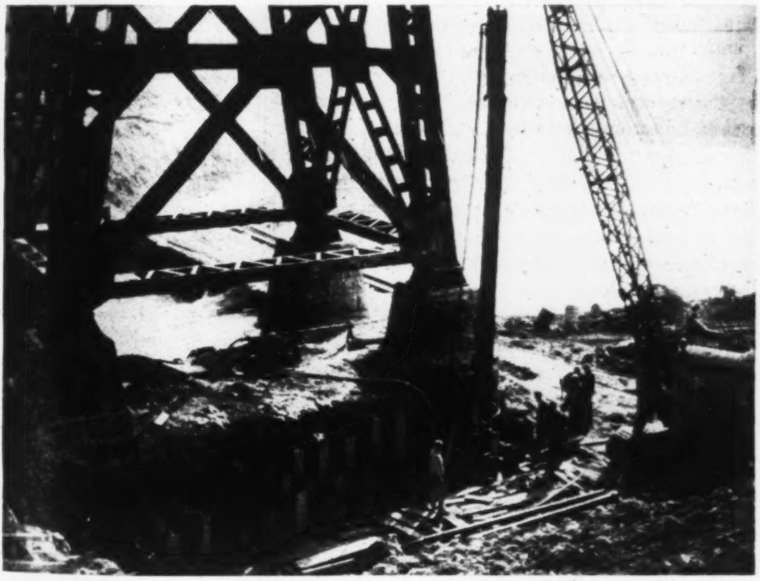


Fig. 6. Pier 3 was constructed immediately adjacent to existing footings by driving H-piles to bearing materials and extending them upward to near the bridge

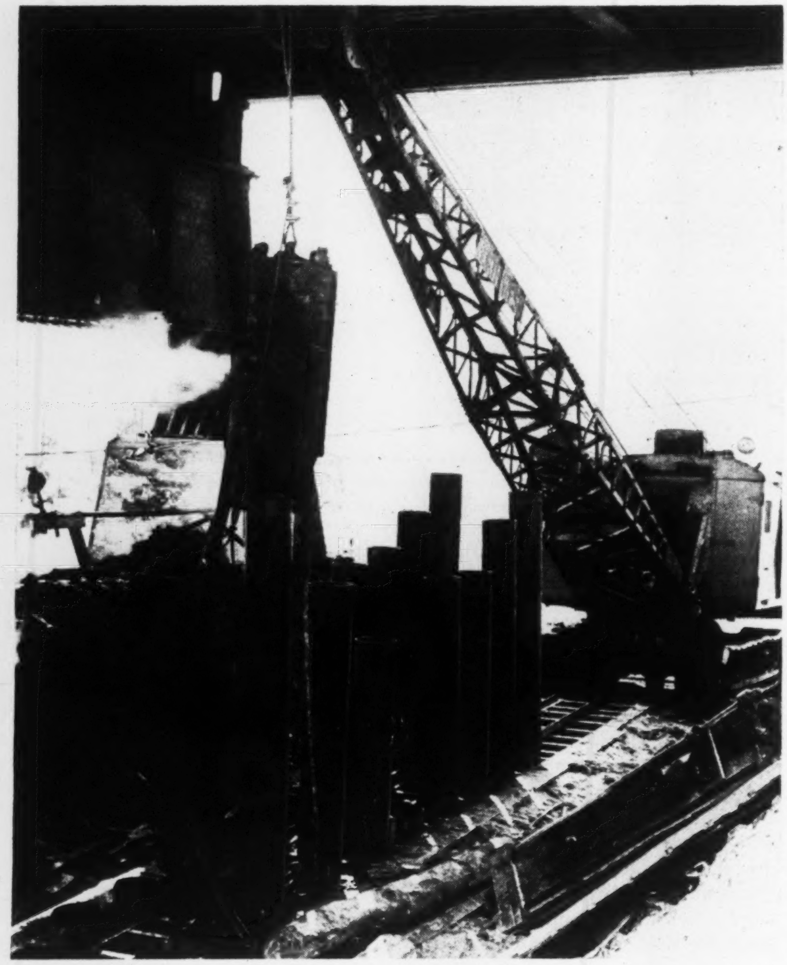


Fig. 8. Piers 1 and 4 rest on pipe piles filled with concrete and, from near the ground line, are encased in concrete.

support transferred from the vertical cables to the driven sheeting, Fig. 5.

Sheetpiles were driven to a depth of 40 ft. followed by excavation inside the cofferdam to a depth of 25 ft. An orange-peel bucket was used through dredging pockets left between the cross bracing of the frames. A steel grid that formed an exact template for the H-beam bearing piles was attached to the horizontal rings of the frame, and through this the bearing piles were driven in lengths as great as it was practical to handle under the existing bridge. They were spliced as required by reinforced butt welds to extend them upward to 6 ft. below the bridge seat.

A frame of 3x3x$\frac{3}{8}$-in. angles at 9-ft. spacing was used above the water line to space the H-piles. The heavy bracing of the usual H-pile piers, which requires exact alignment and position of each pile, was made unnecessary by the concrete encasement.

The cofferdam, serving as a form, was filled with carefully graded stone aggregate by dumping from a clamshell bucket and allowing the material to settle through the water. Care was taken to fill around and between the bearing piles.

Grout was made with 4½ bags of portland cement and one bag of a special admixture, made up of finely divided siliceous material and an intrusion agent designed to disperse the cement particles, increase flowability and reduce shrinkage. Mixed with 7 cu.ft. of fine sand and 24 gal. of water, this was forced into the stone through $\frac{3}{4}$ in. dia. pipe, placed to the full depth ahead of filling with stone. Pipes were placed at 5 ft. centers longitudinally with one row on the centerline and a row at 4 ft. on each side in the 11 ft. 6-in. wide pier and were pulled up as filling progressed.

A more satisfactory method of placing grout was found in the use of old 2-in. pipe slotted at 2 ft. centers and set on the pattern described above. A 1-in. hose carried the grout to the full depth of the pipe and was pulled up as the grout filled the pier, a much easier operation than lifting the $\frac{3}{4}$ in. pipe against friction of the stone.

Above the cofferdam, conventional forms were used to encase the pier and this, too, was filled with graded stone, vibrated while being filled. Grouting above the ground was done through vertical pipes and also through $\frac{3}{4}$ in. pipe in the side of the forms. Grout was discharged some 18 in. from the form face.

Pier built up—then down

Pier 3 of the new substructure presented an entirely different problem, since it is located only a few inches from the masonry pedestals of a pier of the old structure. The base of the new pier extends about 40 ft. below the base of the old tower support, and the H-beam piles of the new pier continue some 30 ft. below that. The H-piles were driven through a guide frame that also served as a template for a ring of steel sheet piles driven to 40-ft. depth. It was not practical to excavate this cofferdam, as was done at Pier 2, while the load was supported on the old towers. Yet, it was necessary to develop a load bearing pier and shift the superstructure to it before the existing support was disturbed.

The steel H-pile supports provided the answer. The piles were extended to near the bridge seat elevation and, above the ground line, were encased in concrete made by packing the form with stone and forcing in grout. The concrete was carried on a timber grillage at the ground line forming a spread footing some 2 ft. larger than the pier, and on this the form was built.

After the superstructure was shifted the existing towers and shallow pedestals were removed and the ground sloped to the lines shown on the plans. The sheetpiling around the pier was burned off to plan elevation. Below that level excavation inside the cofferdam was done manually to the depth

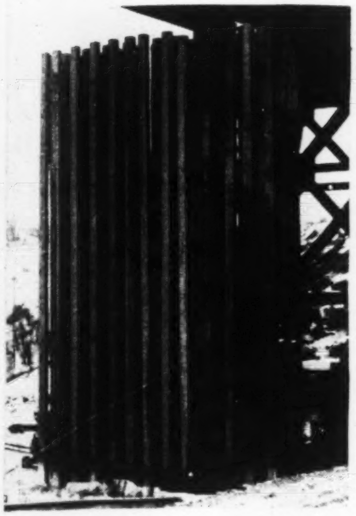


Fig. 7. Only light bracing, welded on in the field, was required to hold the piles properly spaced while being encased with made-in-place concrete.

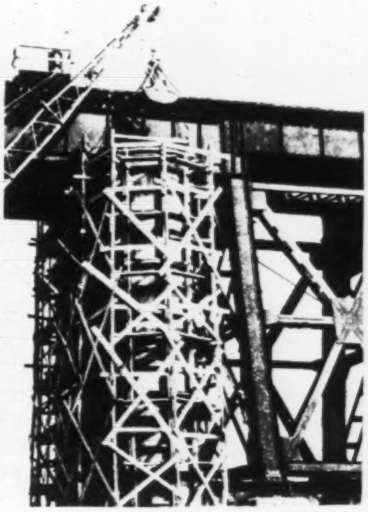


Fig. 9. Graded stone was placed in the pier encasement form by clamshell bucket and grout intruded to complete the pier.

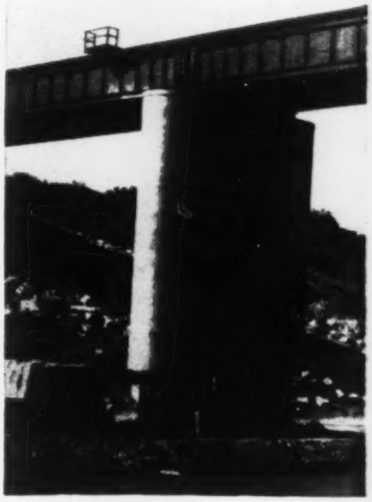


Fig. 10. Excavation below the ground line after the upper section was completed temporarily exposed the bearing piles of Pier 3, while under full load.

of the concrete section of the pier, some 40 ft. below water level. Spoil was lifted out in small buckets. Bracing was progressively installed as the excavation proceeded.

During this period the pier presented a very unusual appearance, as shown in Fig. 10. Above the existing ground line it is a finished pier. Below that level its appearance is that of slender supports for an oversize superstructure.

As soon as excavation was complete the cofferdam was filled with crushed stone. A form was set to connect with the upper part of the pier and, after this was filled with rock, grout was forced in. Forcing grout in under pressure assured full bearing under the existing concrete, but this is not depended upon for load carrying ability as the piles carry the weight of the structure directly into the ground.

For piers 1 and 4, along the slope, pipe piles were driven to good bearings, and filled with the prepacked type of concrete. The pipe piles extend to near the bridge seat and are encased, above the ground line, in the prepacked type of concrete jacket used for piers 2 and 3.

The bridge was built under supervision of Harry Stevens, resident engineer, and K. Huffman, engineer of construction, of the Canadian National Railways.

Construction of the substructure was done by C. A. Pitts General Contractor Ltd. of Toronto for whom M. F. Missiaen was general construction superintendent and E. A. Missiaen job superintendent. S. C. Cooper was field engineer for the contractor. Revamping of the superstructure and transfer from the old piers to the new was done by the Hamiliton Bridge Co., Hamilton, Ont.

New Surveying Specifications Adopted at Cleveland

Sponsored and supported by the City of Cleveland, several surrounding suburbs, the county of Cuyahoga, and the Ohio State Highway Department, the Cleveland Geodetic Survey recently adopted specifications for use of the new Cleveland Geodetic Survey Control by plane surveying methods. This guide will enable city, county, state and private practicing surveyors to make full use of the new system.

In contrast to accuracies of 1 in 5,000 which have been used in the past, the new specifications call for accuracies of 1 in 15,000 for control of streets and roads, and 1 in 10,000 for control of property lines. These accuracies are based upon some 25 miles of test runs made by S. A. Bauer, civil engineer and surveyor of Cleveland, over a period of years, with his field crews. The tests indicate that these accuracies can be readily obtained with the usual instrumentation of the profession.

The new specifications follow the standards of accuracy recommended in the "Technical Standards for Property Surveys" adopted in 1946 by the American Congress on Surveying and Mapping. Being of relatively high order or precision, they were planned to extend the value of the work of the geodetic surveyor to the benefit of the end user—the property owner—without noticeable break. They also permit the continued use of time-honored methods and procedures of the property surveying practitioner.

The specifications are not mandatory at the present time, but it is hoped that they will soon become sufficiently well established that they will be required in all surveys that require official approval.

Copies of the new specifications may be obtained from Prof. G. Brooks Ernest of the Case Institute of Technology and consulting director of the Cleveland Regional Geodetic Survey.

How To Use Aluminum Roofing Effectively

LONG LIFE with low maintenance is generally the major consideration in selecting aluminum for roofing. However, unless it is erected properly, such advantages may be lost.

The most important consideration in applying aluminum sheets is to insulate against electrogalvanic action. Ordinarily, aluminum has a high resistance to corrosion. But when it is contiguous to steel or copper in the presence of moisture, an electrolytic cell is formed and the resulting flow of current dissolves the aluminum, causing severe pitting. This condition can be avoided by preventing metal-to-metal contact.

Another significant requirement in using aluminum sheet is to seal the openings made for the fastening devices. Methods of achieving this objective effectively include the use of special washers and waterproof roofing compounds.

Still a third requirement is to maintain loads within safe limits. Design loads should never be exceeded. The sheets should be sufficiently thick to carry these loads safely or should be adequately supported by sheathing. Washers should be used with fasteners to distribute stresses and prevent tearing of the sheet.

As a guide in selecting the proper gage, safe uniformly distributed loads for corrugated aluminum sheets on various spans are given in Tables I and II, which were computed by the Reynolds Metal Co. using a factor of safety of 2½. Similar tables for other types of sheet may be obtained from the various manufacturers.

Penetration of rain prevented

Regardless of the type of sheet employed, certain rules of good practice must be observed. The following procedures are recommended by J. S. Pollack of the Building Products Division, Reynolds Metals Co.:

To provide adequate drainage, the roof surface should never have a slope less than 2½ in. per ft. and preferably not less than 3 in. per ft.

The first sheet should always be placed on the bottom row at the opposite end of the building from which prevailing winds come. Then, as additional sheets are overlapped in laying the first row, protection from driving rains carried by prevailing winds is afforded by the side laps. Application is thus in single rows from eave to ridge, proceeding along the roof toward the windward end.

Side laps for the 1¼-in. sheet should be obtained by lapping two full corrugations. Side laps for the 2½-in. corrugated sheet are achieved by lapping one or one and a half corrugations for roofing and one corrugation for siding. A 6-in. overlap at the ends is preferred for roofing and 4-in. for siding.

Methods of fastening

When 2½-in. corrugated aluminum sheet is used without sheathing on a steel frame, the method shown in Fig. 2a is excellent for fastening to purlins or girts. The scheme utilizes aluminum straps, 12 in. apart, with aluminum bolts and nuts, aluminum rivets or cadmium-plated steel bolts. To prevent galvanic action, direct contact between the top of the purlin and the roofing should be prevented preferably by insertion of an aluminum saddle, or else by painting the flange of the purlin with aluminum or bitumastic paint. Also, roofing paper can be used to separate the metals.

Purlin clips (Fig. 2b) are a fastening device widely used. The U bend is slipped over the purlin flange and a leg hammered down against the web to lock the clip in place. The roofing is bolted to the clip. If standard steel purlin clips are used, they should be hot-dip galvanized.

Purlin nails—either single (Fig.

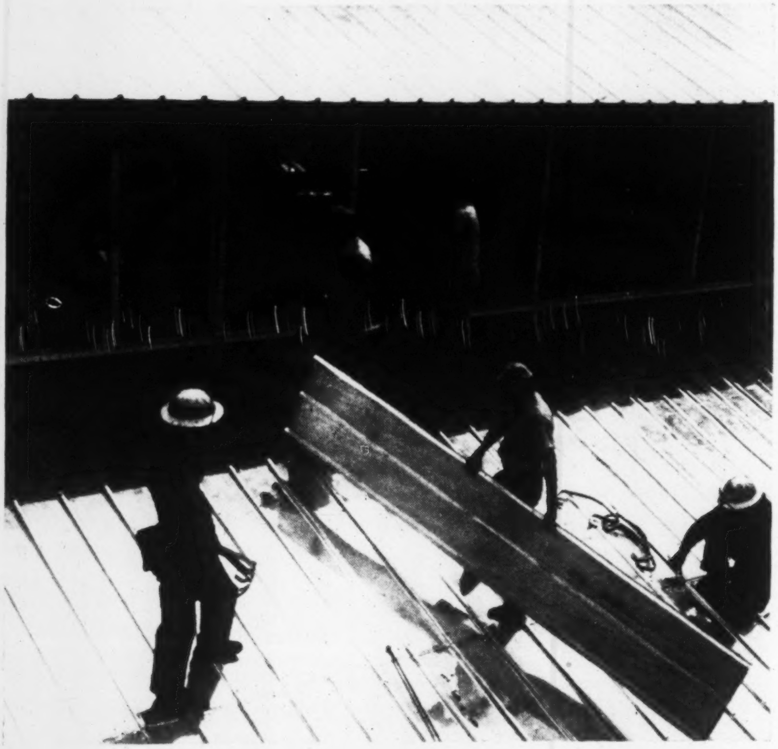


Fig. 1. Aluminum roofing sustains workmen without damage during erection of an industrial building.

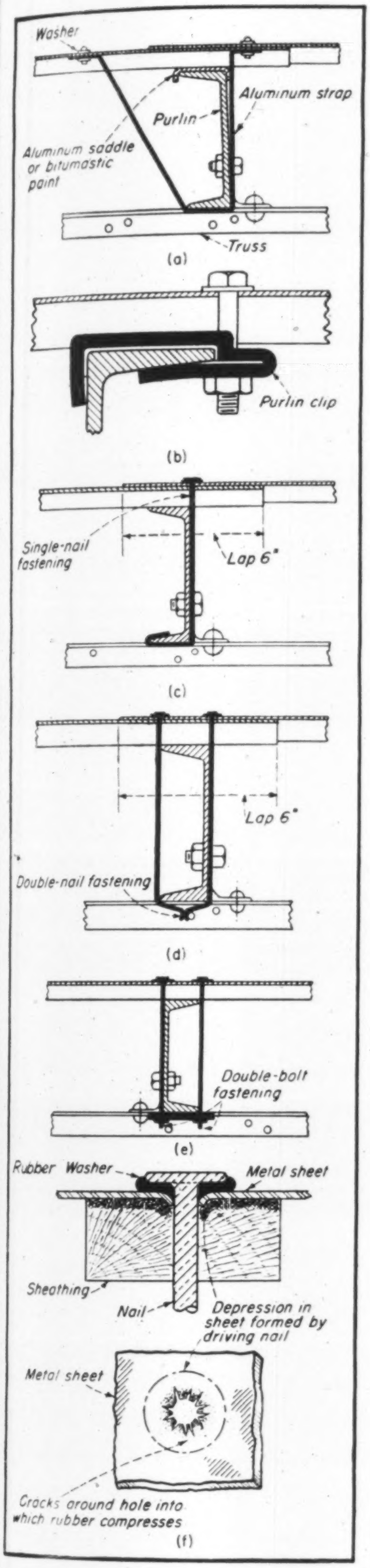


Fig. 2. Methods of attaching aluminum roofing. Views (a) to (e) show fasteners for anchoring to purlins. In view (f) is shown sheet nailed to sheathing.

2c) or double (Fig. 2d)—are also useful in anchoring sheeting. A variation of this method employing aluminum bolts with aluminum washers, nuts and base plate under the purlin is shown in Fig. 2e.

The best method of nailing to sheathing is to use galvanized roofing nails about 1¾ in. long with a head about ⅜ in. in diameter, spaced at 8-in. intervals. These nails should have a hot-dip zinc coating. A plated coating tends to chip off and does not provide as good protection.

Corrugated sheets should always be riveted, bolted or nailed through the top of a corrugation. The reason is that rain running down the roof tends to collect in the bottom of corrugations and would penetrate imperfectly sealed holes there. At the top, water drains away from the holes.

A washer of non-metallic material such as zinc-chromate impregnated fabric, neoprene or other rubber should be employed under a nail head. The purpose of this washer is three-fold—to prevent metal-to-metal contact between the under side of the head and the roofing sheet, to seal the opening made in the sheet by driving the nail through it, and to permit thermal expansion and contraction of the sheeting.

Tests made by du Pont de Nemours & Co., manufacturers of neoprene, indicate that it is an excellent material for washers. It retains its tensile strength and resiliency, without cracking, after long subjection to radical alternations of heat and cold and after exposure to sunlight and oxidizing influences. This characteristic of neoprene persists even when the material is under stress.

Two recent developments by The Gora-Lee Corp. have made the use of neoprene practical for washers. One was the invention of machinery to form the washers at a reasonable cost. The second was the design of automatic equipment to put the washers on the nails. This last step eliminated objections of contractors to the rubber-like washers because of time lost in placing and driving through them. As many as 200 nails and washers can be assembled per minute. The combination is now being produced by several nail manufacturers and may cost no more than conventional lead-washered nails.

Washers made from zinc-chromate impregnated tapes have been found excellent, also. Added protection is derived from the zinc chromate.

Aluminum washers have been used extensively. They are especially valuable where sheets are screwed to wood girts and only plain steel screws are available.

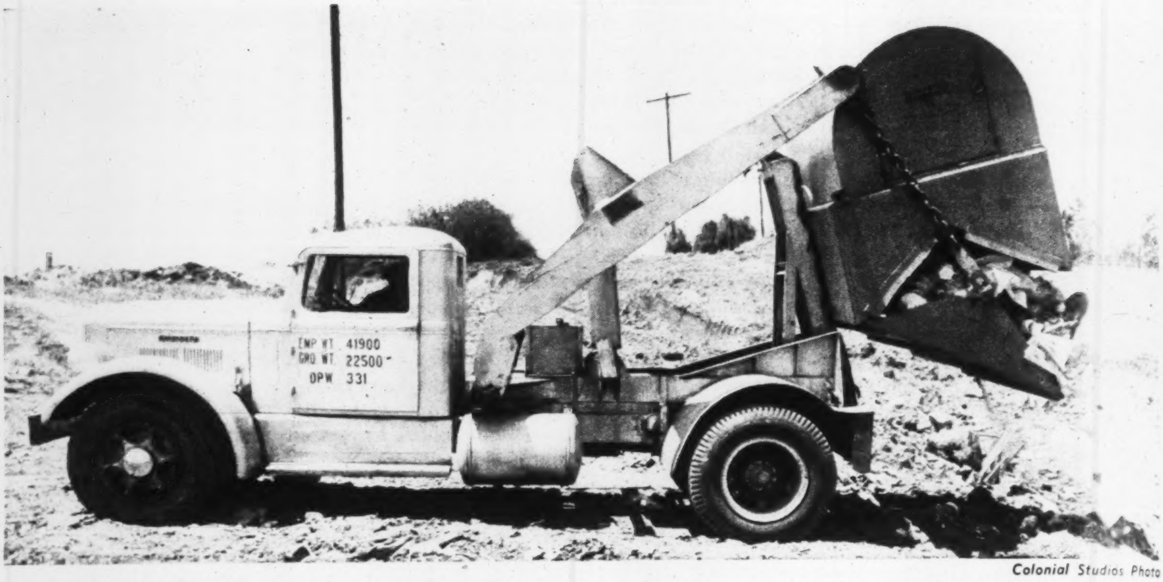
Hot-dip galvanized nails without washers are a satisfactory substitute when suitable washers are not available. Roofing nails with cast-on lead heads can be used in other than industrial or seacoast corrosive atmospheres. The lead heads are easily peened over the sheet to seal the openings. Resort may also be had to cadmium-plated roofing nails, screws or bolts with non-metallic washers, since cadmium surfaces have little tendency to cause deterioration by galvanic action.

TABLE I—SAFE UNIFORMLY DISTRIBUTED LOAD IN PSF. ON 2½ X ½-IN. CORRUGATED SHEET

GAGE	CLEAR SPAN									
In.	18 in.	24 in.	30 in.	36 in.	42 in.	48 in.	54 in.	60 in.	66 in.	72 in.
0.019	99	55	35	25	18	14	11	9	7	6
0.025	129	73	46	32	24	18	14	12	10	8
0.027	140	79	50	35	25	20	15	12	10	9
0.032	165	93	60	41	30	23	18	15	12	10
0.040	206	116	75	52	38	28	23	19	15	13
0.051	260	149	95	66	49	37	29	24	20	17
0.064	332	187	119	83	61	47	37	30	25	21
0.078	420	232	149	104	76	58	46	37	31	26

TABLE II—SAFE UNIFORMLY DISTRIBUTED LOAD IN PSF. ON 1¼ X ¼-IN. CORRUGATED SHEET

GAGE	CLEAR SPAN									
In.	18 in.	24 in.	30 in.	36 in.	42 in.	48 in.	54 in.	60 in.	66 in.	72 in.
0.019	49	28	18	12	9	7	6	5	4	3
0.025	65	36	23	16	12	9	8	6	5	4
0.027	70	39	25	17	13	10	8	6	5	4
0.032	84	47	30	21	15	12	9	7	6	5
0.040	109	58	37	26	19	15	11	9	8	6



Colonial Studios Photo

Fig. 1. Special steel refuse boxes are of a bottom-dump type that are picked up and transported by truck.

Bulk Containers Improve Refuse Handling

***Contents in Brief**—Refuse collection from big producers has been simplified at Richmond, Va., by using large steel boxes transported by special pick-up trucks, collection by this method costing only about one-third per ton for that from small producers. Disposal difficulties have been overcome by adoption of the landfill method, which has reduced the cost of disposal to 8 c. per cu. yd.*

To SPEED up the collection of refuse from business establishments and other big producers, the city of Richmond, Va., is using large steel boxes that can be picked up and transported by truck. Use of the bulk containers in combination with landfill methods of disposing of both rubbish and garbage is permitting a large cost saving over old methods of handling trash from those concerns producing large amounts.

Until a few months ago the refuse from Richmond stores and other large producers was collected by loading the material manually into trucks. This procedure had proven costly, untidy and tended to encourage rats. Therefore, when R. S. Hopson, who served with the U. S. Public Health Service during the war, was named chief of the city's bureau of refuse collection late in 1946, he applied a collection method used so successfully in handling large volumes of refuse at the Norfolk, Va., Naval Operating Base, and other military establishments.

This method called for the use of steel boxes of 6 to 8 cu. yd. capacity and of the type that they could be transported by truck as shown by Fig. 1. A plan was worked out whereby the producers of the refuse purchase the boxes and the city services the containers without special charge.

To date some 85 boxes have been purchased by business concerns and those are being serviced with four trucks, which will be able to service a total of 120 to 140 boxes. They are all of the bottom-dump type and measure 6 ft. deep by 6 ft. in width and 8 ft. long. Each truck handling the boxes costs about $6,000 and the containers cost about $300 each.

No attempt is made to separate garbage and trash in using the boxes, and when a box is removed from a given location an empty one is left in its place. All the containers are emptied at least once a week and at some locations every day, depending on the type and volume of refuse.

Collection costs 38c per cu. yd.

Cost of collecting refuse from the big producers by the method described has averaged 38c. per cu. yd. during the first six months the containers have been employed. During this time a total of over 18,000 cu. yd. was collected, and the figure includes the work of transporting the material an average of 1.3 miles to the disposal site. A breakdown of the 38c. average is as follows: Labor, 14c.; operation and maintenance, 9c.; depreciation, 9c.; and overhead 6c.

In comparison, the cost of collecting nearly 290,000 cu. yd. of refuse from small producers during the same period has averaged 99c. per cu. yd., with labor costing 61c.; operation and maintenance, 15c.; depreciation 4c.; and overhead, 19c. Collection from private homes and the other small producers is primarily with a

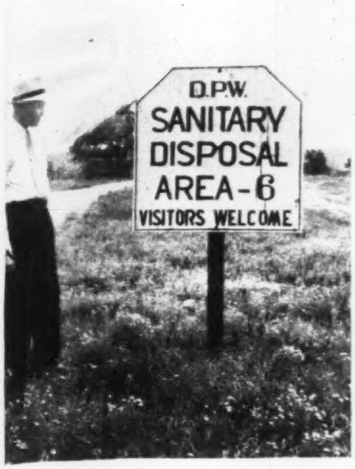


Fig. 2. Favorable comment has been received on use of the landfill method.

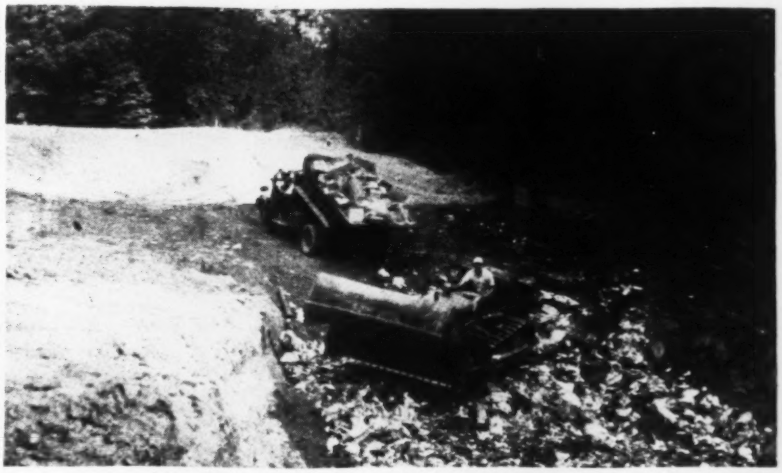


Fig. 3. Refuse is disposed of by landfill methods with excavation, compaction and the fill work accomplished with a crawler tractor equipped with a bucket.

covered truck of the type illustrated by Fig. 4, each unit being operated by a three-man crew with the driver the foreman. However, the city must continue to use a few uncovered dump trucks until these units can be replaced with the covered trucks. In using the old open trucks canvas is utilized to cover the loads.

Until recently, a portion of the refuse at Richmond was transported to the city's incinerator for disposal, and the remainder was disposed of at three open dumps. The 25-yr. old plant is not only located at an inconvenient site but operation costs have been high, the cost for disposal totalling $1.50 per cu. yd. for the small volume incinerated.

To improve these disposal methods, the incinerator is being shut down and the three open dumps are being transposed into landfill sites. Three new landfill areas have also been established.

At the typical landfill site all the earthwork is with a crawler tractor equipped at the front with a "Bull-Clam" bucket (Fig. 3). This unit not only cuts the trench for the refuse, but after travelling back and forth over the refuse several times to compress it appreciably, the unit also adds the earthfill. Thickness of the compressed layer of refuse is generally about 10 ft. and it is surfaced with 2 to 4 ft. of earth. Cost of disposing of refuse in this manner has been only 8c. per cu. yd. The operator for the tractor is the only man required at each site.

Use of the landfill method has found wide acceptance in Richmond, and the improvement over the unsightly open dumps with the smoldering fires so common to these areas has resulted in much favorable comment. Odors are so almost completely lacking at the landfill sites that signs have been erected near these areas inviting the public to inspect the methods being used (Fig. 2). Each week a number of citizens take advantage of the invitation. At one landfill timothy hay is to be grown for feeding the horses used by the city's mounted police.

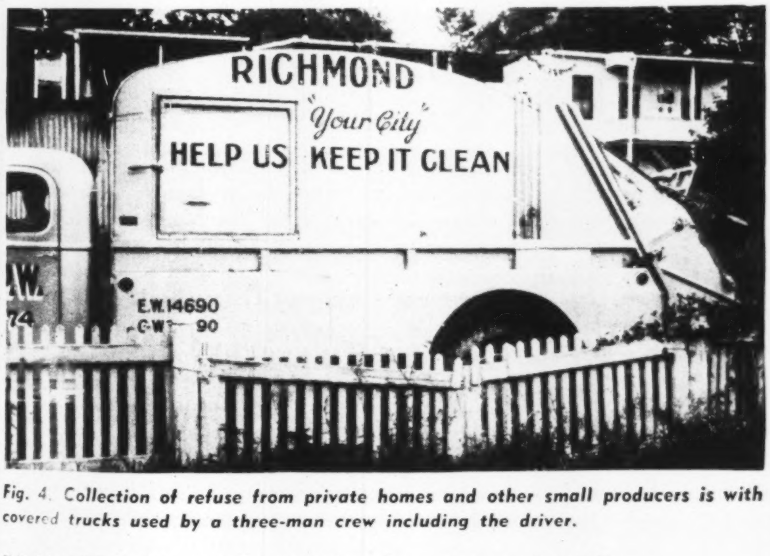


Fig. 4. Collection of refuse from private homes and other small producers is with covered trucks used by a three-man crew including the driver.

Aluminum paint for equipment

As a step to improve still further the activities of the refuse department, all of the department's equipment is now being painted an aluminum color with each unit repainted on definite schedule. In the past, equipment painted in various colors was used, which failed to impress both workmen using the equipment and the citizens alike. Experience to date shows that the operating personnel is taking more pride in their equipment in view of the painting plan and are giving it better care. Moreover, indications are that the general public has also been impressed with the neat appearance of the equipment and the improved service city officials are providing.

R. S. Hopson, director of the refuse department, serves under the general supervision of Gamble Bowers, director of Richmond's department of public works.

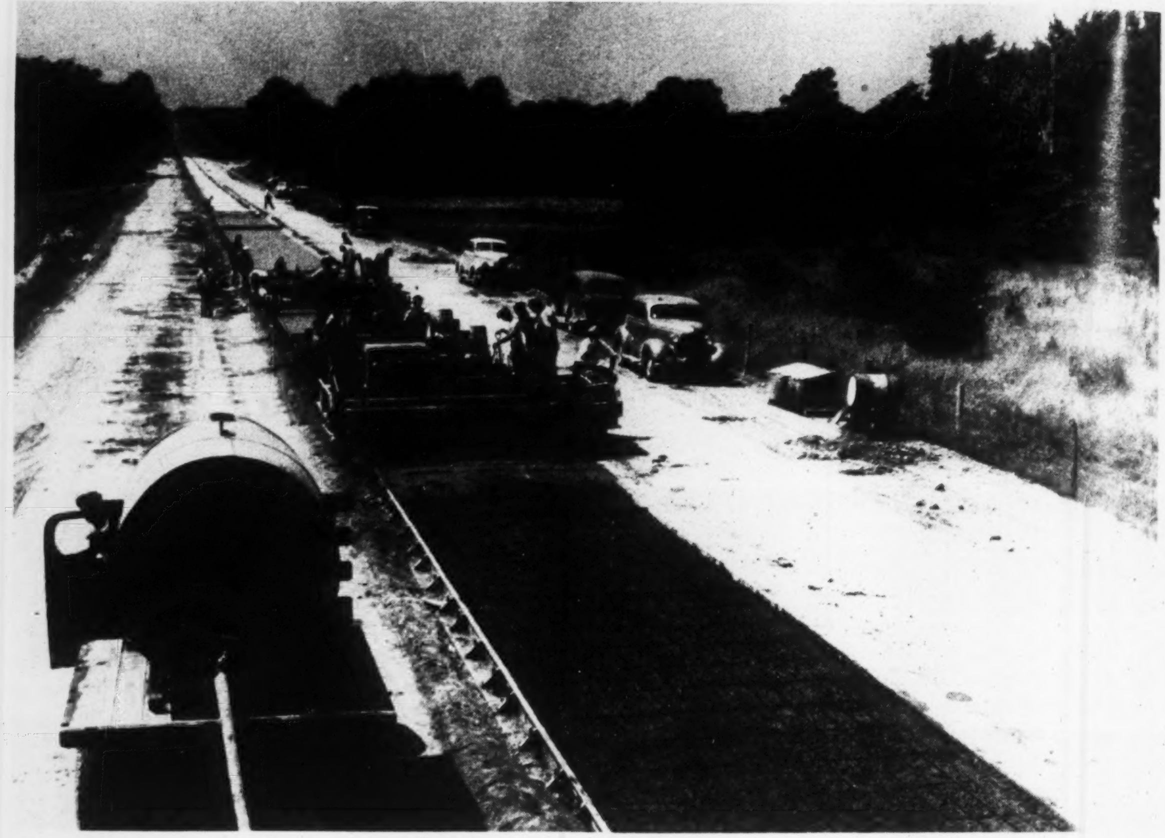


Fig. 1. Paving the center lane of a three-lane highway on U. S. Highway 422 in Western Pennsylvania.

Paving Pennsylvania's Straightest Highway

***Contents in Brief**—By mechanizing the entire job to the utmost and synchronizing all operations to the speed and capacity of one 34-E, dual-drum paver, a foresighted contractor in Western Pennsylvania developed a fast-moving highway concrete paving job despite persistent rainy weather and low productivity of inexperienced workmen. To an engineer, the 10.2-mi., three-lane pavement is unusual in its small amount of curvature and grade.*

WHILE THE TERM, "Pennsylvania's straightest and flattest highway," may be a misnomer when applied to the 10.2-mi. of relocated highway recently completed on U. S. Highway 422 between New Castle, Pa., and the Ohio state line, the project can boast of an exceptionally straight alignment and a minimum of grades.

To illustrate, the three-lane portland-cement concrete pavement, completed last fall has one 5-mile tangent, a 3-mile stretch of 0.0 percent grade and only three curves, the sharpest of which is 1 deg. 30 min. Maximum grade is 4½ percent, and this applies only to two short lengths of pavement.

The 33-ft. pavement, estimated to carry a peak daily traffic count of 9,000 vehicles, replaces a tortuous old two-lane pavement of inadequate capacity. It connects with a 30-ft. paved street entering New Castle and with Ohio's four-lane divided highway that leads to downtown Youngstown, completed in 1940. Road shoulders are 10 ft., either seeded or sodded.

Two adverse factors dogged the contractor from the start of paving last May. One was the abnormal amount of rainy weather; the other, the general low efficiency of workmen inexperienced in this work. Twenty working days were lost on the paving job between May 15 and Sept. 1 due to rain.

Little could be done about the wet weather, other than to expedite the paving to the utmost during fair weather. But the low productivity of workmen was offset to a remarkable degree by (1) mechanizing all paving operations as much as possible and (2) by establishing a well-integrated operating schedule for the several pieces of equipment needed on a paving contract of this size.

Weather permitting, the paving crew of some 100 men worked 58 hr. per week; five 10-hr. days plus 8 hr.

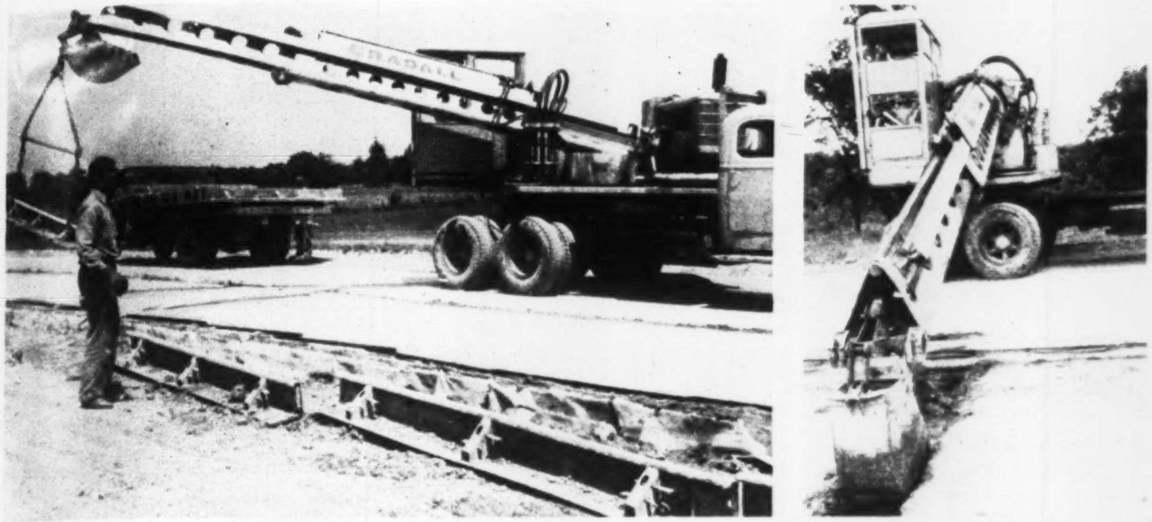


Fig. 2. Steel road forms are quickly loaded onto trucks for transportation and reuse ahead of the paver by a versatile, ***truck-mounted hydraulic crane (at left), which also excavates the cross-drains under the concrete pavement (at right).***

on Saturday. While this involved a substantial premium payment for overtime, part of it could be balanced against the contractor's fixed charges of $460 per day for overhead and equipment rental rates on the $90,000 worth of paving equipment, batching plant and road forms on the job.

One point definitely in the contractor's favor was that he had plenty of room in which to operate. The entire paving operation, from the motor patrol grader that maintained the previously compacted subgrade to the crew sealing pavement joints, was spread over a 2-mi. length of highway.

Operations geared to paver speed

All component operations were synchronized with the progress of the paver, with each of the 22 individual operating units charged with the responsibility of expediting its assigned task at sufficient speed to cause no interference to the succeeding operations.

Beginning with the motor patrol grader, previously mentioned, this integrated schedule of men and equipment included: a ten-ton, three-wheel roller with scarifier; a two-man crew establishing alignment and setting cut-stakes for the road forms; a form-grader excavating a narrow trench of proper depth to receive the road forms.

Next in line came the form-setting gang which placed the 9x9x¼-in. steel forms to proper alignment and set the 18-in. anchor pins with two or three blows of a 6-lb. sledge. These pins then were driven into the subgrade by a two-man crew. In this operation one man drove the pins with a conventional pavement breaker equipped with a driving head and powered with a 60-cfm. compressor towed behind an automobile.

The other man operated the car and handled the air hose. Pins were driven at the rate of three per minute, including time required for moving the compressor. The two workmen took turns driving the pins.

Road forms, of which the contractor had 8,000 lin. ft. on the job, were kept set well ahead of the mixer to give plenty of working space for the power equipment that followed.

Next came the subgrader, operating on two lines of forms in making the final excavation for the first, outside 11-ft. pavement lane. For the center and other outside lane, the subgrader rode on one line of road forms and on the previously placed lane of pavement.

A five-ton, three-wheel roller operated immediately behind the subgrader to give final compaction of the subgrade preparatory to placing the concrete. This was followed immediately by a hand-propelled template for testing the depth of excavation made by the subgrader to insure a uniform and proper thickness of concrete pavement.

This scratch template rode on either the road forms or edge of a previously placed lane of pavement. It was made up of an I-beam frame on rollers and equipped with steel prongs extending vertically through the beam flanges at 6-in. intervals. Prongs were adjusted so as to leave scratch marks on any high spots in the prepared subgrade.

No granular subbase or insulating drainage material was required under the pavement other than 15-in. wide crushed stone drains at 61½-ft. intervals near expansion and construction joints.

Joints every 61½ ft.

Expansion joints, formed with ¾-in. bituminous fillers and sealed with liquid asphalt, are spaced every 123 ft. They are alternated with closed construction joints formed with 14-gage sheet steel spaced 123 ft. apart and sealed at the surface of the pavement with hot asphalt.

Three crews operated between the steel-pronged scratch template and the paver. One excavated the cross-drains and filled them with graded, crushed stone which was covered with a layer of tarred paper to prevent infiltration of mortar when placing the concrete pavement.

A second crew installed expansion and construction joints, while a third wired a preformed light metal strip to the inner face of road forms to form the female portion of the longitudinal beveled keyway between adjacent slabs.

The paver, itself, was a 34-E, dual-drum, which averaged one-half mile of 11-ft. pavement per 10-hr. day. Immediately behind the paver was the usual concrete spreader, followed by two finishing machines and a longitudinal screed, or "bullfloat"—all operating in the usual manner on the road forms or on one line of forms and a previously placed lane of pavement.

Two concrete finishers needed

Adding the second finishing machine, however, is a typical example of the contractor's foresightedness in supplying adequate equipment to keep pace with the paver.

Final operations included incidental finishing with long-handled screeds to eliminate depressions or high spots in the fresh concrete surface; three longitudinal passes of a coarse burlap drag to provide a nonskid surface; removal of the metal protective caps from the expansion joint fillers, hand troweling of the transverse joints, curing for 72-hr. under a special non-absorbent paper; and sealing with liquid asphalt all expansion and transverse construction joints and longitudinal joints between lanes.

Final finish of the pavement with burlap drags required a minimum of hand labor. The first drag was attached to the rear end of the longitudinal screed. The two-man crew operating the long-handled hand screeds also made the second pass with a burlap drag.

In this case the burlap was tacked to a 13-ft., 2-in. timber pole spanning the 11-ft. pavement, and spiked to short timber standards near each end which rested on the road forms when the drag was not being operated.

The third and final pass of burlap was made by the two-man jointing crew after removal of expansion joint caps and troweling of the joints. This final finish was made with a lightweight rig the same as that used for the second pass.

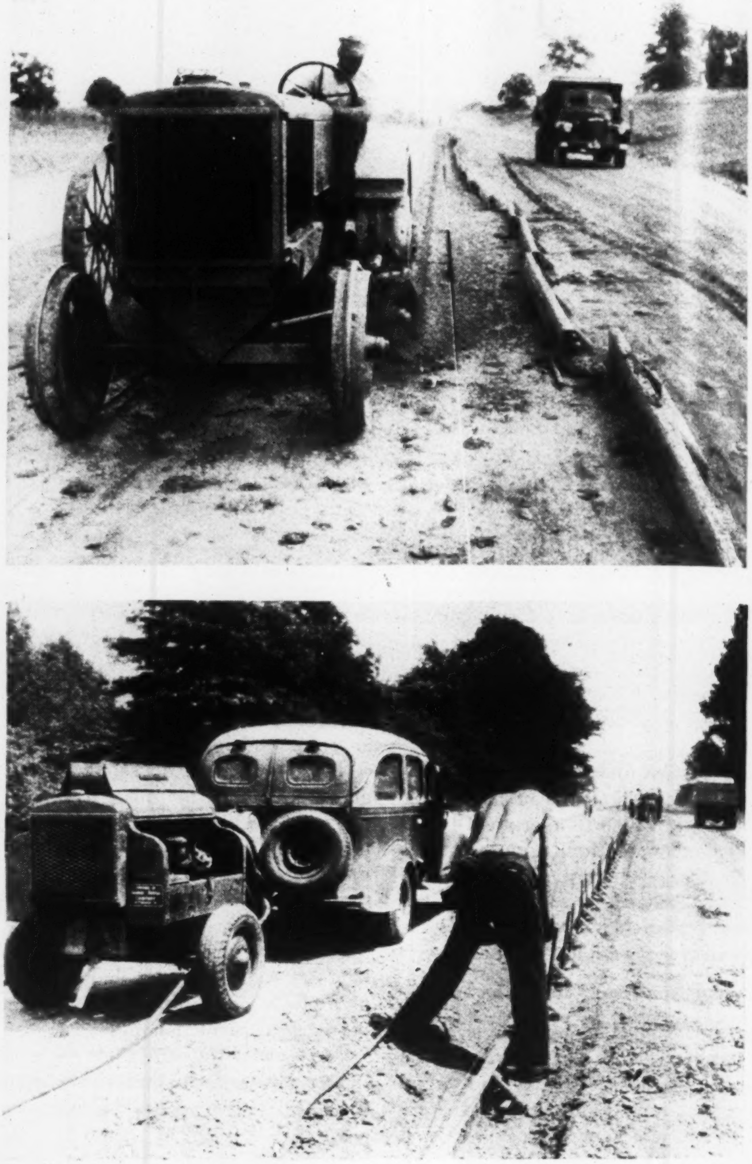


Fig. 3. Following excavation of a smooth, shallow trench with a form-grader (at top), steel road forms are positioned and anchor pins driven with a pneumatic hammer (at bottom).

Adequate batching plant

All concrete materials were processed by a portable batching plant of a capacity adequate for all requirements of the paver. It consisted of a 300-bbl. cement bin and a 105-ton aggregate bin capable of processing 73 batches per hour for the 34-E paver. Bulk cement was shipped in hopper cars and elevated into the bin.

Sand and crushed limestone aggregate were delivered to the batching plant by trucks, from commercial producers. Aggregates were first stockpiled and then hoisted to the three-compartment bin by a $1\frac{1}{2}$ cu.yd. clamshell crane. Stockpiles were kept policed by a track-type tractor equipped with an elevating bulldozer blade.

A fleet of two-batch, end-dump trucks deliver the batched aggregates and cement to the mixer. The number of trucks varied with the length of haul; reaching a maximum of 25 for the longest haul on the job, which was 7 mi.

Mixing-water was delivered in three truck-mounted 1,250-gal. tanks. While this was more hauling capacity than normally needed, it insured against

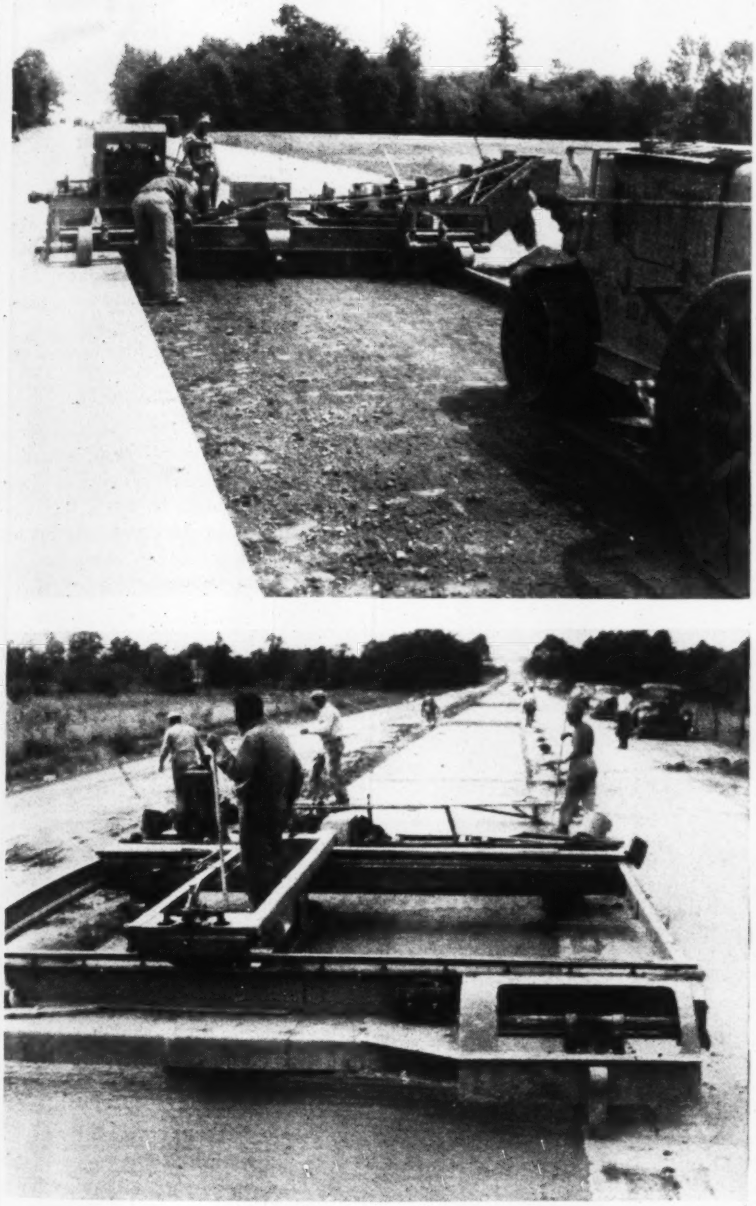


Fig. 4. Working just ahead of the paver, a subgrader and light roller prepares the subgrade to receive the pavement (at top). Final finish is by a longitudinal screed (at bottom) which follows behind a concrete spreader and two finishing machines.

delay of paving operations due to temporary breakdown of one of the trucks.

Then, too, when all three trucks were not needed to deliver water to the mixer, one served as a sprinkler to keep that portion of the subgrade used as a haul road in good condition, thus protecting the shoulders and minimizing the amount of final subgrade treatment needed prior to paving. One truck also made a complete trip twice daily to fill the several ice-water containers spread out over the job.

Hydraulic crane saved hand labor

Much time and hand labor was saved by a versatile truck-mounted hydraulic crane which operates both ahead and behind the mixer. Its two chief functions were (1) to excavate the cross-drains after final preparation of the subgrade and (2) to load the steel road forms onto trucks when they were no longer needed behind the mixer. The forms were unloaded and redistributed by hand.

Excavating the cross-drains, which extend from shoulder to shoulder of the roadway embankments and are 15 in. wide and vary in depth from 4 in. to 15 in., would have been a laborious pick-and-shovel job if performed by hand due to the high degree of compaction of the subgrade. With the mobile hydraulic crane, however, one operator, a truck driver and one laborer could excavate 850 lin-ft. of drains per day.

The hydraulic crane could load 2,500 lin. ft. of the heavy 9x9x$\frac{1}{4}$-in. steel road forms on trucks for redistribution ahead of the paver, in two hours. This one operation saved much time and eliminated considerable back-breaking work that would have been necessary if it was done by hand.

Design requirements of pavement

Design plans called for the three 11-ft. lanes of pavement to have a 9-in. uniform thickness and a constant slope of $\frac{1}{8}$-in. per foot each way from the center line of road. It is reinforced with $\frac{3}{8}$-in. welded bar fabric placed 2 in. below top of slab. Cross-bars are spaced 24 in. apart while the spacing of longitudinal bars varies from 9 in. at center of each 11-ft. pavement to 6 in. near edges.

Specified compressive strength of concrete was 3,000 psi. at 28 days. An air-entraining agent was added to the cement but no vibrating of the fresh concrete was required.

A typical 34-E mix included 827 lb. of cement; 1,493 lb. of sand; 1,453 lb. and 1,438 lb. of Pennsylvania State Highway Department Specifications 2b and 3a crushed stone aggregate, respectively. The water-cement ratio averaged 4.6 gal. per bag of cement.

Shear-transfer devices of $\frac{3}{4}$-in. rods, hooked at one end and coated with asphalt on the other, were installed at 12-in. spacings across all expansion joints. Longitudinally, the 11-ft. pavement slabs are tied together with 4-ft. long, $\frac{1}{2}$-in. reinforcing bars at 5-ft. intervals.

These tie bars extend through and are held in place by the preformed

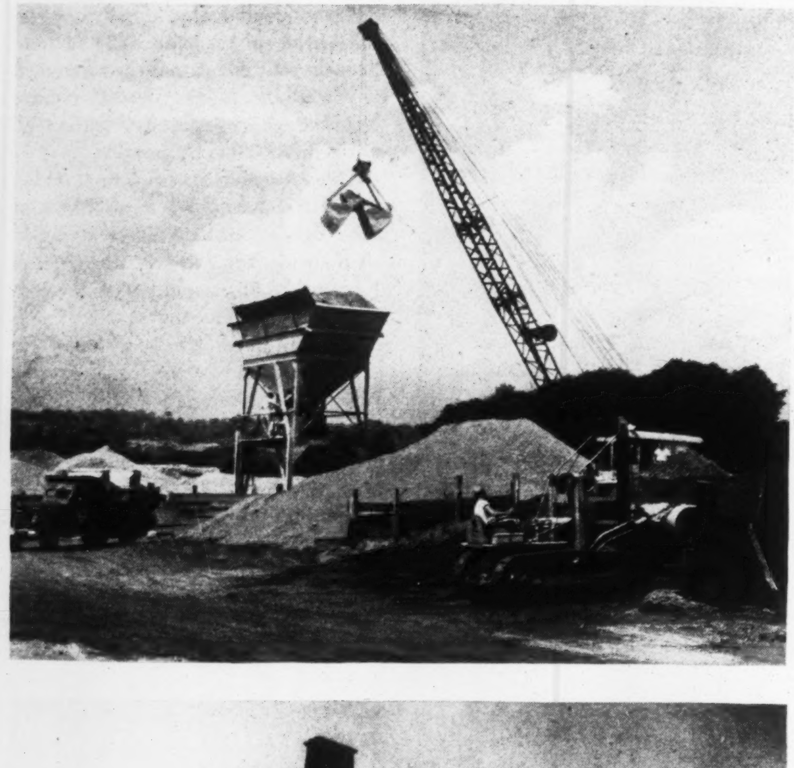


Fig. 5. Aggregates are batched in a 105-ton batching plant (at top), while bulk cement is handled by a 300-bbl. steel bin (at bottom)

steel strip that forms the female portion of the beveled keyway between slabs. One-half the length of each bar extended out into the area to be paved, with its end bent down to bear on the subgrade. The other half was bent 90 deg. and lay snugly against the road forms, inside the beveled keyway form.

After a lane of pavement had been placed and permitted to harden, the bent one-half length of the tie rods were straightened to permit their being embedded in the adjacent lane of pavement when it was placed.

Total contract price for the 10.2-mi. project, including grading, paving and miscellaneous drainage structures, was $1,473,000. It involved 600,000 cu.yd. of excavation at a unit contract price of $0.54 per cu. yd. and 190,000 sq.yd. of portland-cement concrete pavement at $3.5[illegible] per sq.yd., plus $0.15 per sq.yd. for subgrade treatment.

Contractors and engineers

The S. J. Groves & Sons Company, Minneapolis, Minn., was the contractor, with Donald O. McKay, vice-president, serving as field superintendent in charge of the entire job. E. Miller Smith was field engineer and assistant superintendent of construction. Charles Gregg was in charge of paving and L. L. Burris was in charge of concrete paver mixer operations.

For the Pennsylvania State Highway Department, Howard W. Jones was project engineer, E. A. Bryden district construction engineer and S. W. Jackson district engineer.

San Francisco Bolsters Public Works Planning

San Francisco has given its new planning department authority to approve or reject proposals for development, sale, or purchase of land by any city agency according to the American Society of Planning Officials.

The department was created by a recent amendment to the San Francisco charter. Voters at the same time bolstered long-range urban development in San Francisco by providing for a new zoning ordinance and a separate zoning administration.

Under the new setup, San Francisco planners are charged with development of both annual and six-year budget programs to coordinate capital improvements of all city departments involved in the municipal master plan.

More than $87 million in bonds for capital improvement called for by the master plan already have been approved. The funds will be spent for transit modernization, new parks, and improvements to the water supply and other city services.

The new planning department is composed of the former planning commission and its staff, with the city's chief administrative officer and the manager of public utilities serving as ex-officio members.

Trapping Sand in Water

Lynn Perry
Designing Engineer, Department of Water and Sewers
Miami, Fla.

Contents in Brief*—*Two parallel pre-treatment units consisting of an upflow sand trap and a propeller-agitated, chemical-mixing basin have been included in the expansion of Miami's water-filtration plant from 40 to 60 mgd. The sand trap will remove fine quartz sand picked up from pockets in limestone strata from which the well water supply is pumped. At an upward velocity of 0.0767 fps., it is anticipated that particles smaller than 80-mesh size will settle out. In the recirculating mixing basis a velocity of about 6.37 fps. will be maintained to prevent deposition of floc.

To PROVIDE improved chemical mixing and to intercept fine quartz sand at the beginning of the purification process, two parallel units consisting of an upward-flow sand trap and a propeller-agitated mixing basin have been constructed as a part of a program to enlarge the capacity of the Miami water treatment plant from 40 to 60 mgd. Each unit is designed to operate at 30 mgd., and in event of a shutdown either unit may be used to treat the entire flow.

Although sand has never been a serious operating problem, the raw water is pumped from limestone strata containing lenses of fine quartz sand, about 20 percent of which passes a 100-mesh sieve. Sand traps are required to prevent these particles from entering the flocculators and clarifiers which are not designed for the removal of heavy solids, and to eliminate sand in sludge from which lime will be reclaimed. If the lime thus produced contains sand, its usefulness will be limited and its marketability impaired.

In the revamped treatment process, greater agitation at reduced detention was desired. To accomplish this, two reinforced concrete mixing basins, each containing five vertical compartments and a central propeller agitator, have been constructed to replace the four 30-ft. dia., 28-ft. deep, steel units used for this purpose since 1924.

Completed in February 1947, the first sand trap and mixing basin have functioned satisfactorily since that time.

Fig. 1. ***Upward flow from the sand trap is collected and carried to the mixing basin by means of two five-foot wide troughs. A second sand trap and mixing basin unit is under construction in the background.***

Velocity change traps sand

Briefly, the sand trap consists of a concrete tank, 20 ft. wide, 30 ft. long and 25.5 ft. deep, into which the sand hopper (a frustum of an inverted pyramid, 12 ft. deep) is set so that the top opens against the four walls of the tank, and the bottom, 5 ft. square, opens downward into 3-ft. deep sand collection pit. This arrangement is shown in Fig. 2.

At the bottom of the tank, well-water is introduced in one corner of the entrance chamber—the annular space between the sloping sides of the hopper and the walls of the grit chamber—to set up rotary motion in one direction and thus discourage sand deposition. For inspection and cleanout a large manhole as well as dewatering piping is provided.

To permit flow into the hopper, openings 13 ft. long and 9 in. wide are provided along the vertical centerline of each sloping face. Parallel to and 12 in. above each face, these openings are baffled by means of two 2 by 8-in. planks supported on a metal framework.

Passing upward, the water expands into the widening hopper and its velocity decreases permitting sand particles to settle into the hopper. The maximum horizontal area, 600 sq. ft., was found by limiting the velocity to 0.0767 fps., the rate at which the sand will be deposited. This value was determined from the formula

$$V = 424\ (\text{specific gravity} - 1)\ D^2$$

where

V = velocity of water in millimeter per sec. and

D = diameter of the particle in millimeters

If the rate of flow equals 46 cfs., the velocity

$$V = 46/600 = 0.0767 \text{ fps. } (23.4 \text{ mm. per sec.})$$

Then, with the specific gravity of quartz taken as 2.35, the diameter of particles (D) which will settle was found by substituting in the formula as follows:

$$23.4 = 424\ (2.35-1)\ D^2$$
$$D^2 = 0.0408$$
$$D = 0.2 \text{ mm.}$$

This particle size is somewhat smaller than the openings found in the standard 80-mesh sieve. If the total plant flow during servicing is passed through one unit, the velocity will be sufficiently low so that the quartz deposited would pass a 60-mesh sieve.

The formula used above was checked, some years ago, in the hydraulic laboratory at Lafayette College, Easton, Pa. and was found reliable within the range of those experiments.

Sand withdrawn hydraulically

For withdrawal of sand from the hopper, a 6-in. pipe fitted with a quick opening gate valve is provided. Connected to one end of the tee directly beneath the hopper floor, a 2-in. blowout pipe will be used to put the sand in motion in event that the normal hydrostatic pressure fails to do so. Moreover, a jetting agitator consisting of a 4-ft. square of 1½-in. pipe with 5/32-in. holes on 6-in. centers drilled to discharge horizontally inward is located 6 in. above the floor (Fig. 2). Water introduced at high pressure through this device is intended to break up compaction and facilitate outflow.

The discharge line leads to a 20-ft. square, concrete decanting tank where sand settles and the carrying water is drawn off. On a number of occasions the discharge line and decanting tank have been tested and found to operate satisfactorily.

Three operating conditions were anticipated when the discharge line was designed:

1. When the quick opening gate valve is released, sand is discharged into the decanting tank under hydrostatic pressure.

2. When, due to sand compaction in the discharge line, flow is not caused by hydrostatic pressure, water

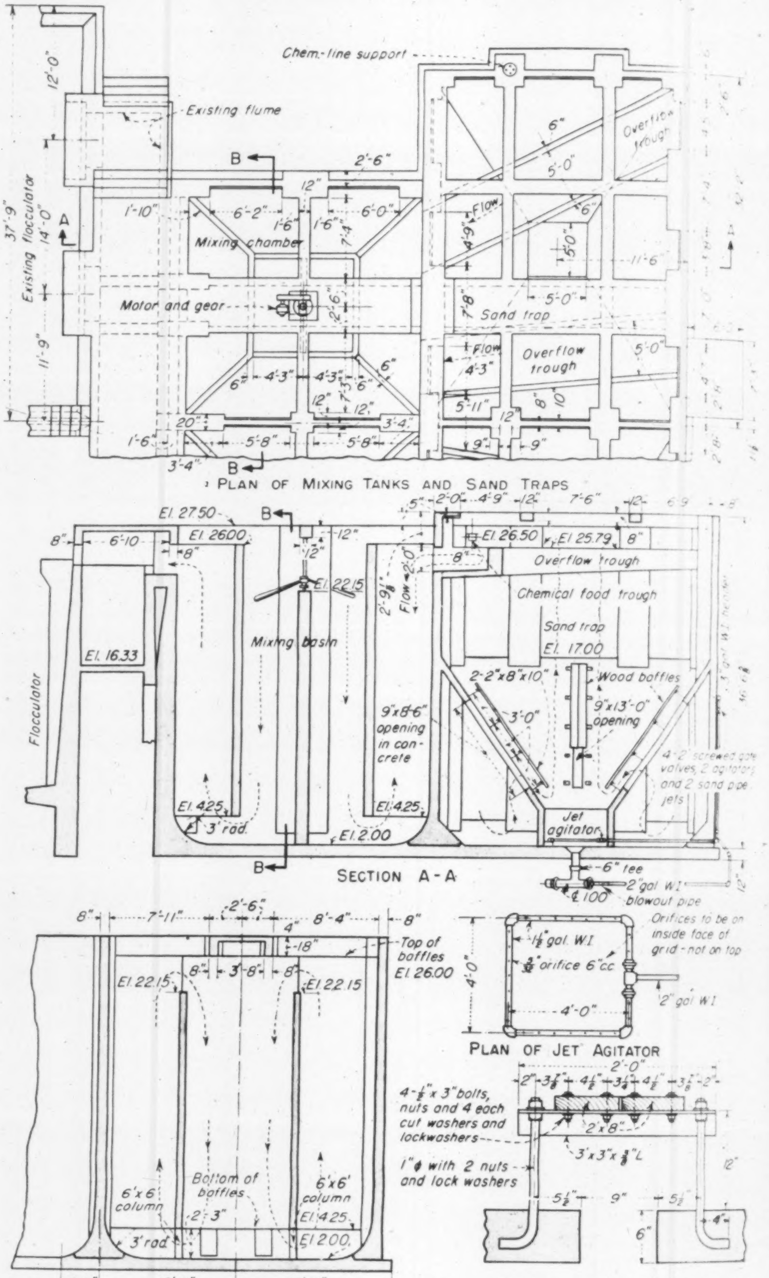

Chem.-line support
Existing flume
Existing flocculator
12'-0"
37'-9"
14'-0"
11'-9"
Mixing chamber
Motor and gear
Flow
Overflow trough
Sand trap
PLAN OF MIXING TANKS AND SAND TRAPS
Flocculator
El. 27.50
El. 26.00
El. 16.33
Mixing basin
El. 22.15
El. 4.25
El. 2.00
3' rad.
El. 26.50
El. 25.79
Overflow trough
Chemical food trough
Sand trap
El. 17.00
2-2"x8"x10"
Wood baffles
9"x8'-6" opening in concrete
9"x13'-0" opening
4-2" screwed gate valves, 2 agitators and 2 sand pipe jets
Jet agitator
6" tee
2" gal. W.I. blowout pipe
6" 100
SECTION A-A
Top of baffles El. 26.00
6'x6' column
Bottom of baffles
El. 1.200
SECTION B-B
1½" gal. W.I.
5/32" orifice 6" cc
Orifices to be on inside face of grid - not on top
2" gal. W.I.
4'-0"
PLAN OF JET AGITATOR
4-⅝"x3" bolts, nuts and 4 each cut washers and lockwashers
3'x3"x⅜" L
1" ϕ with 2 nuts and lock washers
2'x8"
DETAIL OF BAFFLE SUPPORT

Fig. 2. Raw water enters the sand trap below the hopper, expands upward through baffled openings, permitting grit to settle into the central pit, and overflows in two troughs to the mixing basin (Sect. A-A). In the mixing basin flow, driven downward in a central shaft by a propeller, rises in four exterior chambers. Overflow takes place only from the chamber adjacent to the flocculator while upward flow in the three remaining shafts is recirculated.

under high pressure is introduced through the blowout pipe to set up scouring action.

3. When this procedure fails to produce flow (sand caked in or arched above the hopper), the valve is closed and the high-pressure water is permitted to rise vertically and rupture the accumulated cake in the bottom of the hopper.

Immediately after rupture, the valve is opened to permit flow. The jet agitator may be used to assist either of these operations.

Sand-free overflow is collected by two concrete troughs running across the top of the chamber and leading directly to the mixing basin. These troughs are not set square with the tank but are placed on diagonals to concentrate the effluent at the center of one side of the mixer. Designed similar to wash water troughs for rapid sand filters, each trough is 5 ft. wide and varies from 12 to 24-in. deep at the point of outflow.

Immediately preceding discharge, alum solution and lime slurry are dropped from a small chemical-feed canal which spans both troughs at right angles. The rate of feed is governed by means of hand wheel valves.

Mixing tanks follow grit chambers

Built of reinforced concrete, each mixing basin is diveded into five compartments: a central downwell, 8 ft. 6 in. square, and four side wells formed by connecting the outside corners of the downwell to the inside corners of the tank with 6-in. walls. Beneath these walls a 2 ft. 3 in.-high openings permits vertical recirculation.

Operated by means of an electrically driven mechanism, propeller blades located in the center and near the top of the downwell produce a downward velocity of 6.37 fps. As this rate exceeds 6 fps., no deposition of floc is anticipated.

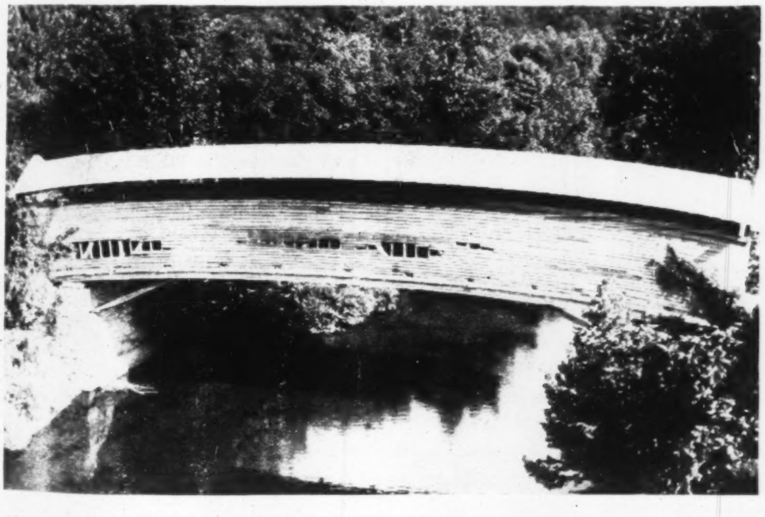
The mixing basin functions as follows: Water from the sand trap enters on one side of the chamber, flows to the downwell, and is forced to the bottom by the propellor agitator. From this point it may rise in any one of the four side compartments. But to flow off to the flocculator, water must rise in the unit directly opposite the inlet. If water enters other compartments, vertical round trips must be made until the outlet section is reached.

Each basin is 20 ft. square with a flow depth of 22.4 ft. providing an average detention period of 3 min. 20 sec. When the entire flow is passed through one tank, this period is reduced to 1 min. 40. sec.

Plans for this improvement were prepared by the Department of Water and Sewers, Miami, W. A. Glass, director, George A. Weigand, chief engineer, and Lynn Perry, designing engineer. The field work was supervised by Wm. C. R. Wendt and W. McGeorge Mason, project engineers. The contractor was the Nu-Way Enterprises, Miami.

Covered Timber Bridges Replaced in Virginia

Covered timber bridges are rapidly disappearing from Virginia's highway network. In 1936, when the state highway department made its first count of those remaining, just under 50 of the many built in that state were still in use. At the end of 1947 only 11 remained in service, plus one or two hulls standing forlornly on abandoned highways. Several of those now used are soon to be eliminated and within two or three years almost all will be replaced with better structures.



Although built over a hundred years ago and having received no maintenance for 20 years, this old covered bridge in Virginia is in good condition. It is not being used for highway purposes.

Although numerous groups have tried to preserve as a historical structure some of the old bridges replaced this has been found to be impractical. The Virginia department is not authorized by law to maintain these crossings as monuments, once they have served their usefulness to traffic. Local authorities and the Association for the Preservation of Virginia Antiquities have made three attempts at preservation, but all failed after a few years.

However, the old structure illustrated by the accompanying photograph has stood on an abandoned section of road near the town of Covington since 1928 with no maintenance and it is still in good condition. The principal framework of this bridge, which has not been used since the relocation of a section of U. S. Route 60, consists of modified Burr trusses of 100-ft clear span. It is the oldest timber bridge still standing in Virginia, having been built over a hundred years ago to span Dunlap Creek.

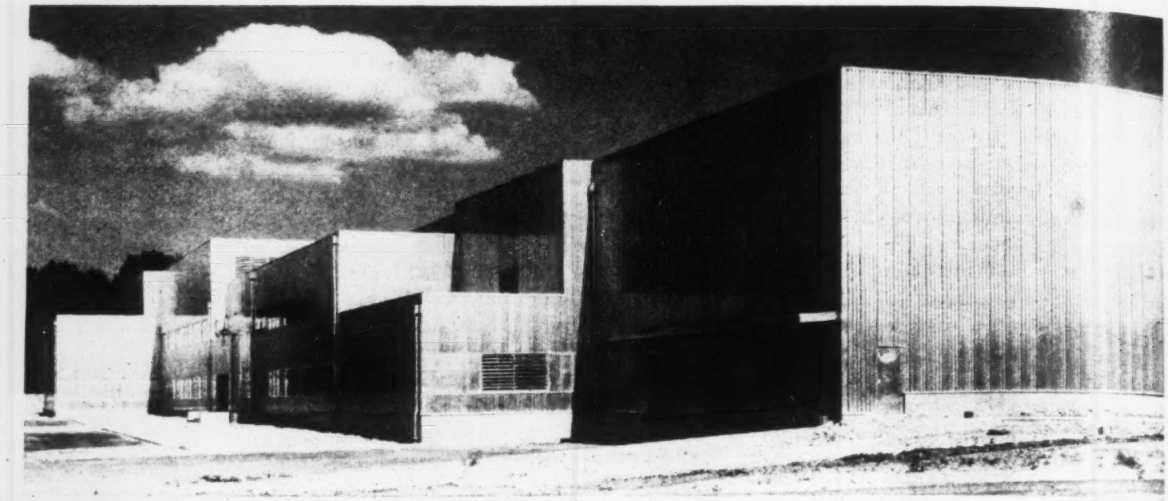


Fig. 1. Both fluted and flat sheets of aluminum are used for architectural effect on the exterior of Duplan Corp. mill.

Textile Mill Walls Faced With Aluminum

John W. Davis
Architect, Lacy, Atherton, Wilson & Davis
Harrisburg and Wilkes-Barre, Pa.

Contents in Brief—*Walls of the Duplan Corp. air-conditioned nylon- throwing plant at Winston-Salem, N. C., are faced on the exterior with 16-ga. aluminum sheets and have an interior wythe of 8-in. cinder-concrete block. The roof deck is composed of light-gage steel panels. Walls and roof are insulated with 2-in. rigid-block type insulation, and windows, used in the office section only, are glazed with double panes.*

SELECTED as an exterior facing because of low maintenance requirements, aluminum incloses a new Duplan Corp. nylon-throwing mill, except for the roof and windows in the office section. Because the plant is air-conditioned, walls and roof are insulated and double glazing has been used in the windows.

Covering an area of about 16 acres at the intersection of Mineral Springs Road and U. S. Route 52, north of Winston-Salem, N. C., the site has been developed for adequate roads, parking and planting. To take advantage of the topography of the ground, about half the plant is built one story high and the other half two stories.

The building has a structural frame of steel and is 210x487 ft. overall, covering an area of about 102,000 sq.ft., with a total floor area of 143,000 sq.ft. It is divided into a ground floor containing the boiler, maintenance, locker-toilet, air-conditioning and refrigeration rooms, cafeteria, general offices and shipping; and a first floor including the receiving and manufacturing areas, laboratory, classroom and toilets.

Insulation blankets building

Due to the rigid control of air temperature and humidity necessary in the processing of nylons, a windowless type of mill was considered to be desirable from the standpoint of insulation and the necessity of maintaining constant uniformity of vision at the machines. Thus, the manufacturing area is entirely inclosed by an insulated wall composed of 16-ga. aluminum sheets and cinder-concrete blocks. Light-gage steel panels are used for the roof deck. Since insulation against condensation becomes a major problem in this type of construction, careful study was made to overcome the necessity for any through metal that might carry outside atmospheric conditions to the inside of the building.

The inner wythe of the exterior walls is composed of 8-in. cinder-concrete blocks. The interior face is painted and utilized as a finished wall surface, except in the office area, where metal partitions are used.

Against the outer face of this wythe and outside the steel frame, entirely encompassing the side walls and roof of the building, is 2 in. of Foamglas, a riged-block type of insulation. Between the rigid insulation and the cinder block or the decking, a vapor seal is provided, in the case of the roof being 15-lb. asphalt felt mopped with steep asphalt (Fig. 2). The finished roof surface is a 20-year bond, pitch-and-gravel, built-up roofing.

The aluminum sheets on the exterior of the buildings are supported on a series of horizontal angle girts anchored to the masonry wall, with a $1\frac{1}{4}$-in. air space provided between

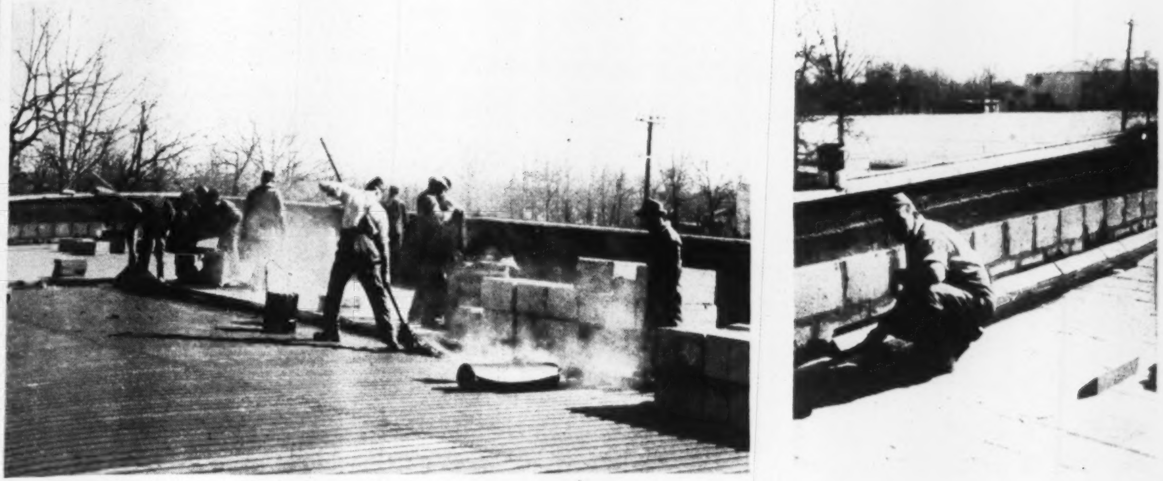


Fig. 2. The steel roof deck is covered with 15-lb. asphalt felt mopped with asphalt (left), rigid-block insulation and pitch-and-gravel built-up roofing. Triangular-prism insulating blocks are used to round corners at the parapet (right).

the facing and the insulating blocks. An architectural treatment was obtained by using various types of fluted and flat sections of aluminum, together with extruded shapes to form the sills and heads of windows and copings (Fig. 1). Combined with store-front sash, these extruded shapes made it possible to use double glazing in the office-section windows and still maintain insulation at the sills, heads, jambs and mullions.

Steel trusses provide large bays

In the manufacturing area, which is 182 ft. 6 in. by 468 ft., interior columns are spaced 36 ft. apart in one direction, and in the other, end bays are 55 ft. long and the central aisle 72 ft. 6 in. Wall columns are spaced at about 18 ft.

Steel trusses are placed 18 ft. on centers, with alternate trusses carried on beams to make the minimum bay 36x55 ft. Providing a clear height of 12 ft. to the underside of the bottom chord, the trusses support the open-web steel joists that carry the roof deck (Fig. 3).

Hardwood floors have been installed in the manufacturing area. In that portion over earth, 1¾-in. maple is placed over 2-in. wood planking, which is embedded in a 1-in. dampproof course on a bituminous concrete foundation about 4 in. thick. In the two-story area, where reinforced concrete floor slabs are used, the dampproof course is placed directly on the concrete. All other floor areas are of concrete, with asphalt tile finish being used in the corridors, laboratory, offices, cafeteria, locker rooms and classrooms. Also, acoustical ceilings are used in these rooms.

Air conditioned by refrigeration

In the application of air conditioning to the plant, no attempt is made to reproduce the temperature associated with comfort cooling. The purpose is to maintain good conditions for textile processing and sustained worker efficiency.

Refrigeration was decided upon after a study of the costs of other means of maintaining the desired conditions—an effective temperature of 80 deg., or a dry bulb of 86 deg. at 60 percent humidity. A total of about 100,000 cfm. of air is circulated through the various departments in the mill, and about 800 tons of refrigeration are employed. The system is designed to maintain a relative humidity with a variation of plus or minus 2 percent throughout the manufacturing area.

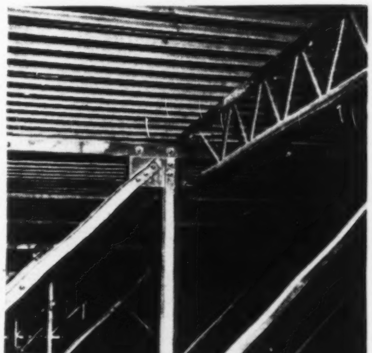


Fig. 3. The light-gage steel roof deck is carried on open-web steel joists supported on trusses spaced 18 ft. apart.

Electrical lines underground

Electrical power is brought from a local power-company transformer bank by an underground service to five unit substations, each located in its own inclosure on the ground floor. These substations are of the unit type with secondary switchboards directly connected. For flexibility in conducting the lines from the substations, a network of man-height tunnels has been carried throughout the unexcavated portions of the building.

The general lighting is fluorescent. It is carried on trolley ducts and provides about 45-foot-candle intensity at the machines.

The building was designed by Lacy, Atherton, Wilson & Davis, architects and engineers, Harrisburg and Wilkes-Barre, Pa., and was built by the Fowler-Jones Construction Co., for whom Dwight S. Jones was in charge. W. H. Dietrich is director of engineering and purchases, John K. Cochran is chief engineer and Henry M. Lilly, Jr., is resident engineer for Duplan Corp.

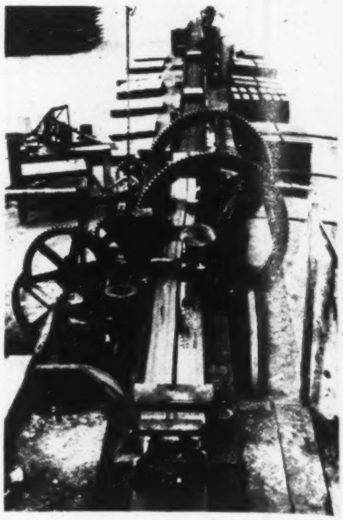
Adobe Brick Stabilized With Asphalt

ADOBE BRICK are being made much more durable than the old, "dried mud" variety by mixing in, while the material is still in a plastic state, enough asphalt emulsion to coat each small particle, thus providing a stabilizing agent that practically excludes water. The result is a strong, durable product that takes up, in a standard, 7-day absorption test, as little as 1 to 1½ percent of its dry weight. This water-resistant quality is in notable contrast with the 10 to 15 percent absorption factor of untreated adobe brick such as those used in building the old California missions.

The stabilized brick are practically unaffected by moisture, meet a compressive strength requirement of 300 psi, and when laid up in a wall 16 in. thick portland cement mortar joints, offer many advantages in insulation and soundproofing as well as freedom from risk of damage by termites, rust, rot, rodents or fire.

Although the cost does not differ widely from that for wood frame and stucco construction, it is hardly fair to attempt cost comparisons on two such radically different types of construction. For example, adobe brick can be laid up with unskilled labor, and the work progresses more rapidly than with burned clay brick as it takes only 100 adobe brick to make a cubic yard of masonry. Also, an adobe house, because of its thick walls, requires 5 to 10 percent more ground area than a wood-frame building with the same inside area. Finally, since the ingredients are available almost anywhere, there is never a shortage of material, and as a result adobe houses have been built during the war years when wood-frame structures were quite out of the question.

Standard adobe bricks, when dry, weigh about 35 lb., measure 4x7½x16 in. (half bricks are also used), and a typical price is $160 per M delivered within a radius of 25 miles of the moulding plant.



A typical extrusion operation uses a compounding screw for forcing the material onto a belt in ribbon form where steel wires cut the ribbons into bricks

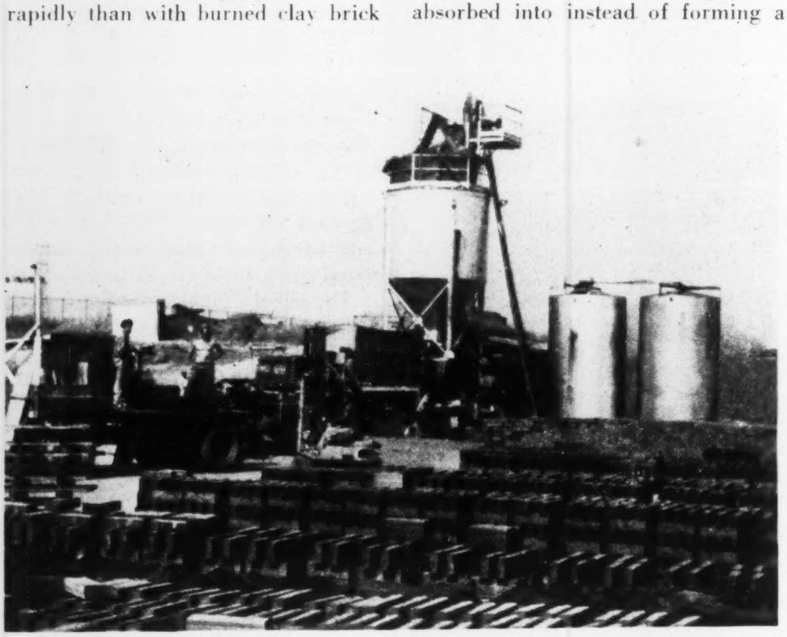
Fines must be limited

It might seem curious that "adobe" soils are not suitable for making adobe brick. However, the requirement is for material in which fines capable of passing a 200-mesh screen will be somewhere between 25 and 40 or 50 percent of the total volume. Adobe, gumbo and other "heavy" soils that have a percentage of fines far above the 50 percent limit, do not qualify nor do soils containing much volcanic ash or pumice. In these two last named the asphalt is absorbed into instead of forming a coating around the individual particles, thus making it necessary to use excessive quantities of the emulsion to get the desired stabilizing effect.

The most desirable ingredients are ordinary silt and sand such as are available almost everywhere. When these two ingredients are properly proportioned, wetted and mixed into a plastic state, the emulsion is added. The specified proportion per cubic foot of mud is one quarter gallon of emulsion made from Grade D asphalt of 60-70 penetration. This emulsion must be specially prepared so that it will mix, without breakdown, with the finest of soil colloids. After thorough mixing the mud is extruded and cut, or is molded, into desired sizes. Simple mechanical equipment is satisfactory for mixing and molding.

Drying is done in the open and takes from a few days to two or three weeks, according to humidity, temperature and wind. When drying has reduced moisture content to less than 5 percent the brick can be shipped to the job. Some plants cover the drying brick with paper to prevent cracking from too speedy a loss of moisture. All plants turn the brick on edge, usually 24 to 48 hr. after molding, to speed the rate of drying.

Selection of the right soils is important because the stabilizer does not add much to the structural strength of the brick. That is, there must be enough clay binder to pro-



In this plant soils are blended and the mixture, after the addition of asphalt and water, is extruded, cut into brick sizes, and put out in the sun to dry.

vide the desired strength. The primary function of the stabilizer is to protect that strength by excluding moisture.

When the required proportions of fine and coarse particles do not occur in the natural soil deposits of a location where brick are to be made, this can be corrected by "blending" or adding imported materials, a practice found economical even at some of the larger plants equipped to produce up to 6,000 or 8,000 bricks per day.

Such a capacity calls for an output on the order of 60 to 80 cu. yd. of processed "mud" put through the molding machines each day. Only a few plants of this size are as yet in operation, but some 30 plants on the West Coast alone are licensed for commercial manufacture of stabilized adobe brick, and perhaps two to three times that number of smaller operators are using the process.

Obtaining a license is mandatory because the process is patented. Thus the licensor can prevent the start of ill-advised manufacturing ventures by issuing licenses only where available material is naturally proportioned or can be economically blended into a mix that will make good adobe brick.

In line with improvement in the material by the stabilization process, the design of modern adobe construction also has been improved, particularly in the matter of resistance to horizontal forces. Current standards call for reinforcement that gives adobe structures all the resistance to seismic forces that can be built into any buildings of the masonry type. Features of design that accomplish this include concrete foundations, concrete lintels and capbeams for the walls, steel reinforcing extended from foundation to cap concrete and around all openings. Also, bars or twisted wires are laid horizontally in the cement mortar joints at intervals of a few courses.

Licenses for manufacture of the stabilized "Bitudobe" brick, details and specifications for their manufacture and data on design and construction standards for adobe buildings are obtainable from the American Bitumuls Co., 200 Bush St., San Francisco, patentee of the asphalt emulsion stabilizing process.

Wooden Blanks for Contraction Joints

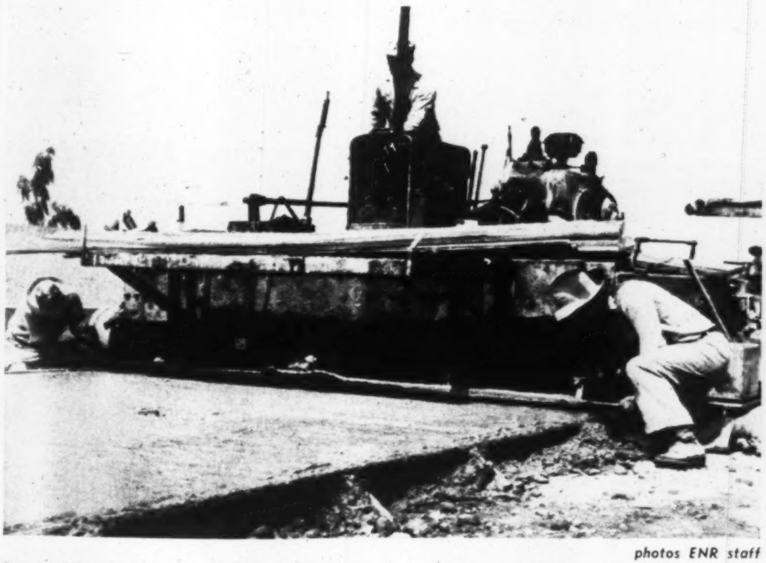
USE OF WOODEN BLANKS to make dummy contraction joints in concrete highway pavements is a recent development in California highway practice. This method is used instead of the old system of placing some sort of mastic material in a groove formed in the pavement. The blanks are left in the pavement and readily form a dummy crack which has the advantage of leaving a smooth pavement with no joint material protruding above the surface.

The blanks are made of straight grained wood and are ¼ in. thick and 2 in. wide. They are placed in the concrete about ¼ in. below the finished surface so that a crack will appear in the pavement about one day after it is placed. The pavement shown in the accompanying picture is 8 in. thick and 12 ft. wide. Joints are placed each 25 ft.

To place a blank, it is fitted into a metal holder that is then placed in a frame mounted on a finisher which immediately follows the paver. An electric vibrator on the frame vibrates the blank into the freshly placed concrete. The metal holder prevents damage to the blank while being placed and it is immediately removed. After the blanks are placed, other finishers can process the pavement surface and the blanks are not disturbed.

The first application of this method in southern California was on work on the Santa Ana Parkway which will connect the heart of downtown Los Angeles with the industrial and residential area to the west and south.

George T. McCoy is state highway engineer and S. V. Cortelyou is district engineer for the Los Angeles highway area in which the Santa Ana Freeway is located.



photos ENR staff

Fig. 1. Wood strips are vibrated into freshly placed concrete pavement and left in place to form dummy contraction joints.

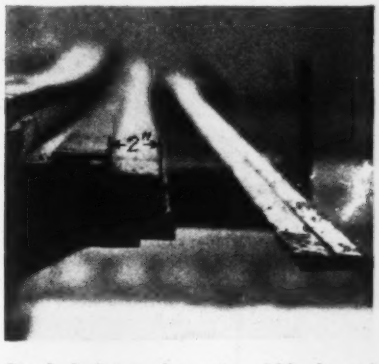


Fig. 2. End view shows size of blanks and also the metal holder (right) used to place them.

Comment and Discussion

Readers' opinions on matters that concern engineers and contractors

Vermont's Forest Fire Precautions

Sir: In your Nov. 6, 1947, "News Issue" you reported the extreme damage in New England by forest fires which generally raged out of control at the peak of the October drouth. Your report emphasized the damage in Maine, New Hampshire, New York, and Massachusetts. You did not explain the remarkable absence of damage in Vermont.

There is an opportunity here to inform your wide and influential reading public of simple methods and action which prevented severe damage in Vermont. While all the states around it were suffering, Vermont avoided these losses.

I have spent the last 25 years in the forest-fire game and I was struck by the absence of damage reports in Vermont. I recently had the chance to visit Montpelier where I inquired for the reasons. They were good.

First, that state has some four or five fire danger stations where the duration of drouth, the dryness of the forests, the wind velocity, and other significant factors are measured each day during the possible fire season. From these measurements and from keen observation by the state forester and his staff, responsible officials, including the governor, were made aware of what was happening. They saw the danger developing two full weeks before it reached a peak. Other states, apparently, were ignorant of impending danger until the holocaust overwhelmed them.

Second, Vermont was willing and ready to take action, even of a type which might cause the people to gripe. Some 10 or 12 days before fire danger peaked, the governor forbade the burning of forest debris. Then he closed the forests to hunting. While these two steps irritated those rugged individualistic Vermonters, they soon saw the wisdom of such action.

Finally the state forester was ready with a well prepared plan for statewide fire detection by all members of the local civil air patrol. Many nonmember aviators also cooperated by regular flights over paths and areas assigned to them. This gave quick detection of every incipient fire.

Local residents also had been organized into firefighting groups. They pounced on each reported fire. Behind them were National Guard units ready to attack those fires which escaped initial attempts. The state forester had trucks loaded with tools and supplies ready at strategic points to rush them to points of need.

The record speaks for itself. The State of Maine took a loss of several lives and 40 million dollars in property. Furthermore, forests that would have produced raw materials to sustain important local industries were lost. Vermont avoided this great damage. Vermont had both the knowhow and the go-ahead.

H. T. Gisborne

In Charge Division Forest Protection
Missoula, Mont.

Earth Compaction

Sir: In the final article of the excellent series on the Reclamation Bureau laboratories written by Messrs. Blanks and Meissner (*ENR* Nov. 27, 1947, vol. p. 737), the following statement appears on vol. p. 740:

"During the war, the Germans were compacting embankments and gun emplacements by new methods, possibly employing vibration. Simultaneously in this country, experiments were being conducted to explore the possibilities of consolidating earth by the application of vibration. Pilot tests have proved very encouraging. However, real problems are presented in the development of practical equipment for applying this principle on the job."

May I point out that the "new" methods which were used by the Germans for compacting sandy soils have been known for many years and they definitely employ vibration.

One of these methods is the Franki compaction technique, which involves driving a steel tube with a "foot" of concrete aggregate, then gradually withdrawing the tube and filling the aperture with broken stone. The vibration caused by this process compacts the surrounding sand.

The other method is the Keller Process, named "Vibroflotation" by its inventor, S. Steuerman—now of 609 W. 137th St., New York City—which employs a powerful vibrator in combination with water introduced into the soil, for compaction of the sand. This method was used widely in Germany and in Norway before and during the war. Fine loess sands and quite coarse gravel have been effectively compacted by this technique, down to depths of 100 ft, the bearing capacity of the soil being materially increased.

In cooperation with the Baldwin Locomotive Works and the General Electric Co., Mr. Steuerman, in 1944, succeeded in building a vibrator considered by him to be an improvement over the German design. The performance of this machine was thoroughly tested by the Merritt, Chapman and Scott Corp., general contractors, under the supervision of Parsons, Brinckerhoff, Hogan and MacDonald, consulting engineers, in November of 1944. A volume of 1,200 sq. ft. superficial area, 27 ft. deep, was impacted by 13 applications of the vibrator. The original relative density, which ranged from 37 percent to 48 percent, was increased up to 90 percent.

The writer believes that the problem of practical application of vibration to soil compaction already has been solved.

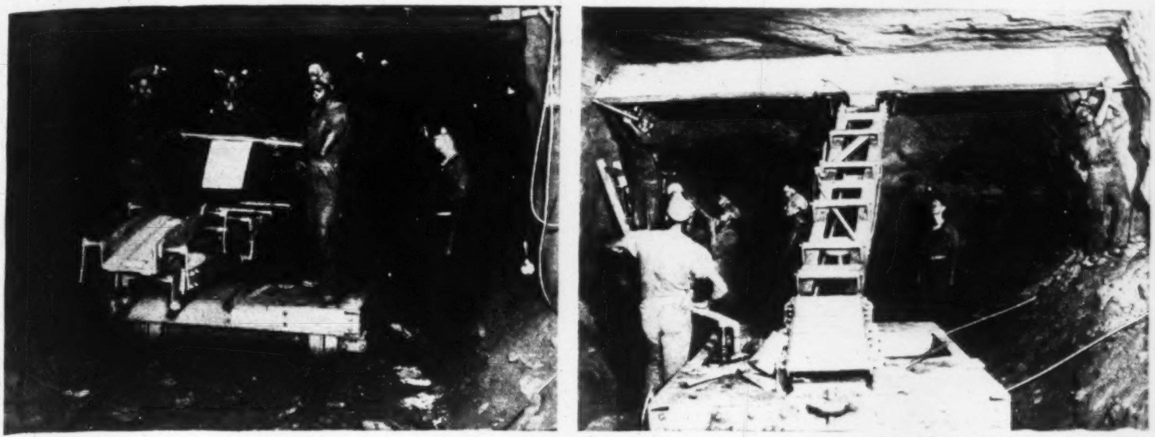
"Vibroflotation" was described in an article that appeared in *Engineering News-Record* July 20, 1939, vol. p. 87. It is also described in detail in the recently-released report of the British Intelligence Objectives Sub-Committee on German Roads and Soil Stabilization. This report quotes the famous German engineer, Prof. A. Agatz, as saying that "Vibroflotation" was the "best idea to come out of soil mechanics in the last 10 years." This report, known as PB-75841 is available at the Library of Congress and from the Hobart Publishing Co., Washington 15, D. C.

E. E. Halmos

Consulting Engineer
Flushing, New York

From Field and Office

WORKING PROBLEMS AND TIME-SAVING METHODS FOR ENGINEERS AND CONTRACTORS



United States Steel Corporation Photo

Heavy timbers for roof support are set in position with ease and safety in 60 percent less time in mines of Tennessee Coal, Iron and Railroad Company, by the use of a timber-setting truck. In operation, the timber is rolled along the conveyor to the cradle at the end of the boom at left where it is securely fastened by four clamps. The boom is 10 ft. long, and can be raised hydraulically by means of a hand pump. About 2 min. is required to raise the boom with its load from 4 ft. to 12 ft. above the track. The cradle can be turned completely around, and the boom can be swung 45 deg. to either side of the track to position the timber in the proper place against the roof and hold it there until it is anchored. A cross collar in an ore mine of this United States Steel Corporation subsidiary in the Birmingham, Alabama district is loaded on the boom and held against the roof while supports are set.

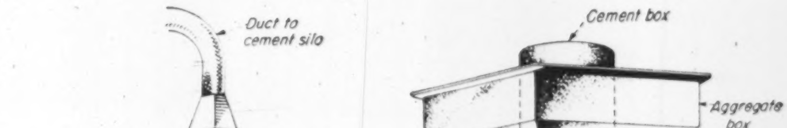
Spick and Span Truck Mixers

Keeping cement dust off truck mixers used for commercial delivery of concrete is being accomplished in several ways, none of which is entirely satisfactory, according to a report of the National Ready Mixed Concrete Association.

One organization is about to install the equipment illustrated. The dust-laden air escaping from the mixer is to be confined between the boot used for charging the mixer and its outer canvas hood. An exhaust fan will collect the dust and discharge it into the cement silo.

Another organization has installed a small gathering hopper with a boot through which the ingredients fall. Installed in the gathering hopper is the mixing-water discharge pipe so arranged that the dry materials fall through a curtain of water. In another instance, a steam curtain is used to blanket the cloud of dust at the top of the mixer.

An entirely different method used is coating the mixers with form oil,



Dust from charging cement into a transit mixer is kept off the mixer by a collector fan that returns the dust to the cement silo.

fuel oil or paraffin oil mixtures. This has not proved altogether satisfactory, one producer claiming that such coatings actually draw dust and that mixers should be kept as dry as possible.

One firm coats the mixers each morning with form oil which can be sprayed or brushed on. At the end of the day a high pressure jet (at least 75 psi.) easily removes dust.

Despite the expense, most commercial suppliers of concrete feel that it is desirable to keep their equipment spick and span. One producer states that the "long and short of keeping trucks clean is complete steam cleaning and repainting at least twice a year with plenty of elbow grease and water between times."

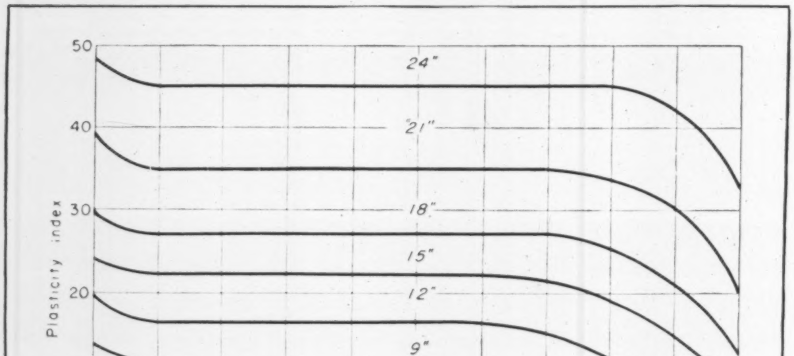
Observation Telescope Converted to Transit Level

To my knowledge, this is the only BC Telescope (1905 Model) in existence that has been converted into a transit level. A sensitive 3½ in. level vial was enclosed in a brass tube and fittings were made to mount it over the ocular tube, in my hobby shop. The front support is stationary and the rear supports are adjustable spring-tensioned screws to properly collimate the transit level. The peg adjustment method was used, or in other words, adjustment of the axis of the vial was made parallel to the line of sight.

This officer's observation telescope (1905 model) has been rebuilt into a transit level. It is sufficiently accurate for use in making preliminary surveys.

The wide angle of view made it necessary to replace the amber sunfilter with a brass disk having a peep hole opening made with a No. 60 drill. Restricting the angle of view to obtain correct alignment of the crosshairs, this is used only to take the final reading after the target has been sighted in. Being a periscope type telescope, the focusing of close objects and at 600 ft. causes an error of ½ in. but by adjusting the level (collimation) to split this amount, the error is reduced to .02 ft., or close enough for preliminary surveys. When more accurate readings are required, they may be obtained by means of a plotted correction curve.—Raymond Shaw, *Decatur, Illinois.*

CHART DETERMINES THICKNESS OF HIGHWAY BASE COURSE



In ENR Aug. 21, vol. p. 277, a chart for the determination of the thickness of a highway base course was given. As that chart was in error, the figures 10 and 20 on the plasticity index being misplaced, the correct chart is given above.

Field and Office Comment

Oil Prevents Corrosion

Sir: In the Field and Office section, *ENR* June 26, vol. p. 1,030, there is an item entitled "Oil Pumped Under Steel Tank to Prevent Corrosion."

Our company has followed the practice outlined since 1941 on tanks varying from 45 to 120 ft. in diameter with capacities from 10,000 to 80,000 bbl.

The tanks are erected on a sand cushion and oil is pumped to the underside of the bottom through a coupling welded to the inside of the tank bottom. One connection is added at the center of the tank and six others located equidistant on a circle one-half the diameter of the tank. A low earth dike is placed around the outside of the tank approximately 2 ft. from the edge and 8 or 10 in. high. Then, hot Bunker "C" fuel oil is pumped into the center hole until oil appears in the other six connections. Following this, oil is pumped successively into these connections until it shows up at the edge of the tank. When the tank is filled, the excess oil which has not been absorbed by the sand, is forced out around the edge of the tank coating the welded joint between the bottom and side plates.

Since all of these tanks have welded bottoms, the use of oil provides a test of these welded joints. In a few cases slight leaks due to a porous weld were found and corrected.

After the excess oil and the small earth dike have been removed, a coating of hot asphalt is applied to the outside surface of the tank, 12 in. above the tank bottom to weatherproof the bottom and side welded joint.—P. L. Bartow, *Mechanical Superintendent, Florida Power Corp., St. Petersburg, Fla.*

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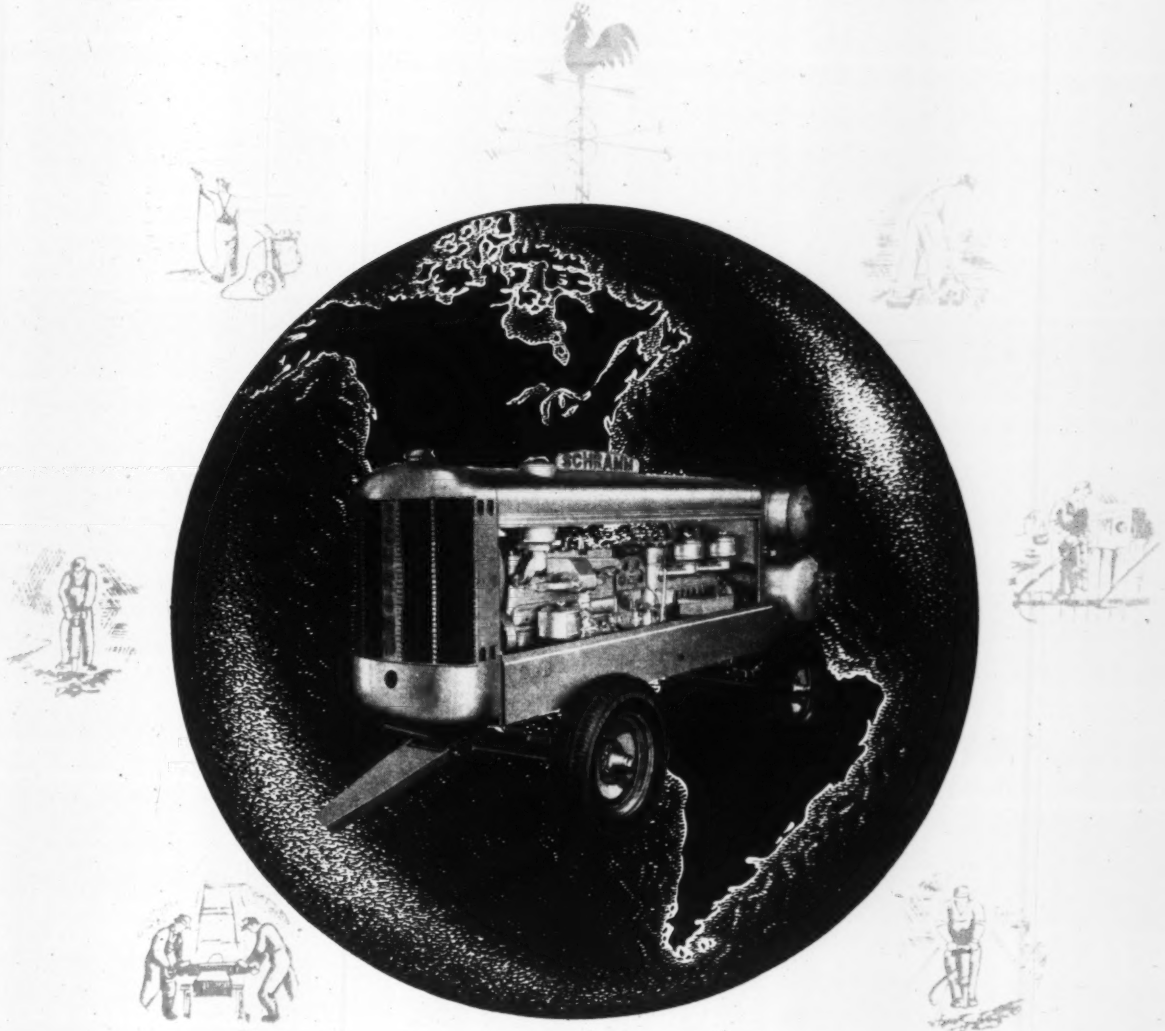

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UNIT PRICES BID BY CONTRACTORS

Cement Concrete Pavement, Baton Rouge, La.

OWNER: Louisiana State Highway Department, Baton Rouge, La; L. H. Hadnot, Projecting Engineer.

PROJECT: Clearing, grubbing, excavation and grading of 4.886 miles of Portland Cement concrete pavement on Pollock-Linceeum Highway, Grant Parish, Junction Route 14, northerly on relocation of Route 14. Work includes slab and mulch sodding, laying of 18 in., 24 in., and 30 in. culvert pipes and 6 in. and 8 in. perforated concrete pipes; installing concrete test piles, meshed and barbed wire fences grouted concrete block revetments; and removing and relocating buildings.

CONDITIONS: Stipulated contract time is 200 contract days. Access to job site is available by the Missouri-Pacific Railroad. Prevailing skilled labor wage rate is $1.25 per hour; semi-skilled, $.70 per hour; and common, $.60 per hour.

BIDS: Four bids were received, ranging from the contract low of $649,538.29 to $702,296.38. Contract was awarded October 8, 1947.

LIST OF BIDDERS:

1. W. R. Aldrich & Co., Baton Rouge, La. (contract)	$649,538.29
2. T. L. James & Co., Inc. Ruston, La.	674,329.66
3. Central Const. Co., Inc., Monroe, La.	683,292.73
4. Austin Bridge Co. & Austin Road Co., Dallas, Texas	702,296.38

	Item	Quantity	Unit Prices (1)	(2)	(3)
1	Clearing	90.744 ac	$125.00	$100.00	$140.00
2	Grubbing	55 ac	100.00	200.00	140.00
3	Common excavation	229,509 cy	.29	.30	.30
4	Drainage excavation	26,602 cy	.35	.30	.30
5	Special borrow excavation	191,327 cy	.37	.36	.40
6	Overhaul on excavation	20,402 st y	.02	.01	.01
7	Slab sodding	92,657 sy	.50	.60	.55
8	Mulch sodding	19,660 cy	1.35	1.00	1.25
9	S.C. gravel surface crse. (gr. B spec.)	1,275 cy	3.50	4.00	4.00
10	P.C. concr. pvt., type B (22′-9″-6″-9″)	62,111 4 sy	2.44	2.66	2.65
11	P. C. concr. pvt., type B (8″ uniform)	432 sy	3.50	3.50	3.50
12	P. C. concr. pvt., type B (6″ uniform)	1,222 2 sy	2.44	2.50	2.55
13	Exp. joint filler (wood) (¾″)	2,250 sf	.45	.50	1.00
14	Poured filler, asphalt mineral	19 ton	100.00	80.00	85.00
15	Dowel assembly	28,690 lf	.38	.35	.45
16	Tie bar assembly	25,750 lf	.06	.10	.10
17	Black magnetic iron traffic stripes	258 sta	6.00	5.00	6.50
18	Class "A" concrete	1,999.97 cy	50.00	52.00	49.40
19	Class "D" concrete	350 21 cy	30.00	32.00	36.00
20	Deformed reinforcing steel	358,543 lb	.10	.10	.10
21	Fabricated carbon steel	51,153 lb	.35	.32	.33
22	R. C. culvert pipe (std. str.)—18″	279 lf	3.00	3.00	3.50
23	R. C. culvert pipe (std. str.)—24″	549 lf	4.50	4.50	4.75
24	R. C. culvert pipe (std. str.)—30″	843 lf	6.00	6.00	6.00
25	Fert. broadcast (comr. fert.) (6-8-4)	31,200 lb	.05	.05	.05
26	Precast concrete piles—16″	5,215 lf	7.50	8.00	6.85
27	Jetting concrete piles	127 ea	5.00	1.00	5.00
28	Unloaded concrete test piles	3 ea	750.00	800.00	700.00
29	Loading test piles	3 ea	250.00	200.00	200.00
30	Pilot holes	127 ea	1.00	5.00	5.00
31	New barbed wire fence	13.45 sta	15.00	18.00	17.50
32	New comb. mesh & barbed wire fence	81.78 sta	18.00	20.00	20.00
33	Single swinging walk gates	5 ea	25.00	30.00	40.00
34	Single swinging driveway gates	10 ea	40.00	50.00	50.00
35	Project marker (bronze)	2 ea	25.00	20.00	40.00
36	R/W markers (concrete posts)	74 ea	4.00	4.00	4.00
37	Grouted concrete block revetments	1,725 sy	3.00	3.00	4.50
38	Salvaged surfacing material	75 cy	2.00	3.00	2.00
39	Perforated concrete pipe—6″	366 lf	1.50	2.00	2.50
40	Perforated concrete pipe—8″	1,900 lf	1.65	2.15	2.75
41	Concrete handrail	1,098.52 lf	4.50	4.00	5.10
42	Rem. & reloc. of bldgs. & misc. strs.—5 units	lump sum	1,560.00	910.00	1,550.00
43	Moving bldgs. & misc. strs.—625 bldg. ft.	lump sum	222.50	430.00	245.00

Southern Pacific Cascade Line Railroad Relocation, Lane County, Oregon

OWNER: U. S. Engineers, Portland, Oregon; Col. O. E. Walsh, engineer.

PROJECT: Constructing the Lost Creek Section of the Southern Pacific Cascade Line Railroad relocation, including clearing and grubbing, and stripping. Constructing embankment from borrow, drainage structures, a timber bridge, a change in the Lost Creek channel and a highway underpass. Placing protection stone in the channel approach and outfall sections of the multiple arch concrete culvert and relocating a portion of the existing Lost Creek county road. The site of the work is located approximately 0.6 of a mile south of the village of Dexter, Lane County, Oregon, in the vicinity of Lookout Point Dam Reservoir (Meridian Site).

CONDITIONS: Access to job site is available by both rail and highway. Stipulated contract time is 365 days after notice to proceed. Prevailing skilled labor wage rate ranges from $1.85 to $2.25 per hr.; semi-skilled labor rate is $1.75 per hr.; and common, $1.50 per hr.

BIDS: Five bids were received, ranging from the contract low of $1,748,777.50 to $2,775,055.00. Contract was awarded Oct. 27, 1947.

LIST OF BIDDERS:

1. McNutt Bros., Eugene, Ore. (contract)	$1,748,777.50
2. Dorena Const. Co., Cottage Grove, Ore.	1,971,883.00
3. Macco Corp., Clearwater, Calif.	2,390,540.00
4. Morrison-Knudsen Co., Portland, Ore.	2,536,318.00
5. Leonard & Slate & C. Hall, Portland, Ore.	2,775,055.00

	Item	Quantity	Unit Prices Engineer's Estimate	(1)	(2)
1	Clearing and grubbing	25 ac	$513.00	$1,500.00	$1,175.00
2	Excavation, unclassified, from government borrow areas	1,520,000 cy	.95	.68	.867
2a	Excavation, unclassified, from contractor borrow areas (alternate)	1,900,000 cy	.68	....	.674
3	Excavation from stockpiles	35,000 cy	.50	.60	.44
4	Stripping	51,700 cy	.38	.60	.44
5	Foundation excavation	3,500 cy	7.75	7.00	2.75
6	Concrete	9,400 cy	33.50	28.25	32.00
7	Cement	14,100 bbl	4.00	4.20	4.00
8	Reinforcing steel	1,436,000 lb	.102	.0975	.06
9	Damp-proofing	450 sq	6.50	12.50	9.00
10	Dumped riprap	11,600 cy	1.92	4.00	2.00
11	Filter material	5,800 cy	3.45	5.00	2.75
12	Dry rock pavement	10 cy	9.50	30.00	14.00
13	Corrugated metal culvert pipe, in place—36″	160 lf	11.90	15.50	12.00
14	Corrugated metal culvert pipe, in place—18″	180 lf	9.45	6.75	5.00
15	Perforated track drain, in place—12″	50 lf	7.50	4.00	3.50
16	Perforated track drain, in place—8″	50 lf	4.90	2.75	3.00
17	Abutment drain, in place—4″	20 lf	2.70	1.50	2.50
18	Pipe railing, in place	700 lb	.26	1.00	.80
20	Sprinkling	2,000 M gal	3.30	2.00	2.00
21	Additional rolling	1,000 roll hr	7.12	8.00	9.00
22	Right-of-way fence, barbed wire	1,260 rod	2.74	5.00	5.00
23	Right-of-way fence, barbed and woven wire	1,200 rod	4.00	6.50	6.50
24	Gravel surface for roads	7,450 cy	2.10	3.00	2.00
25	Cartage	2,650.8 ton	5.20	1.25	1.50
26	Corrugated metal culvert pipe, in place—48″	80 lf	25.00	23.00	17.00

Continued on page 101

Bituminous Surfaced Road, Statesboro, Ga.

OWNER: City of Statesboro, Georgia; Wiedeman and Singleton, Engineers.

PROJECT: Excavating and paving 2.4 miles of street, curb and gutter with a pebble soil base course and bituminous surface treatment; installing storm sewers and appurtenances in Statesboro, Georgia.

CONDITIONS: All materials to be furnished by contractor. Access to job is available by both rail and highway. Stipulated contract time is 120 working days. Skilled wage rate is $1.75 per hr.; semi-skilled, $1.00 per hr.; and common, $.75 per hr.

BIDS: Eight bids were received, ranging from the contract low of $94,836.80 to $124,837.65. Contract was awarded September 4, 1947.

LIST OF BIDDERS:

1. Ridle Huber & Co., Inc., Greenwood, S. C.	$ 94,836.80
2. T. D. Lamb, Jr., Vidalia, Ga.	99,298.85
3. Somers Const. Co., Vidalia, Ga.	103,048.07
4. A. B. Newton, Vidalia, Ga.	104,508.25
5. J. G. Attaway Const. Co., Statesboro, Ga.	118,769.25
6. Scott Const. Co., Thomasville, Ga.	120,824.25
7. Ballenger Paving Co., Greenville, S. C.	121,252.00
8. Stewart Bros., Atlanta, Ga.	124,837.65

Item	Quantity	Unit Prices (1)	(2)	(3)
1 Excavation for grading and barrow	10,600 cy	$0.70	$0.50	$0.48
2 Pebble soil base course—6″	37,500 sy	.28	.30	.41
3 Overhaul on excavation	26,000 sy	.015	.015	.015
4 Double bit. surface treatment	37,500 sy	.39	.42	.35
5 Conc. paving for valley gutter construction & widening—6″	1,050 sy	3.00	3.25	4.16
6 Conc. driveway returns	280 ea	5.00	5.00	9.00
7 Comb. conc. curb & gutter	21,120 lf	1.40	1.50	1.39
8 Integral conc. curb—6″x6″	316 lf	.30	.50	.30
9 Concrete header	1,303 lf	.25	.50	.50
10 Class "A" conc. for culvert ext. & extra height curbs	9 cy	75.00	60.00	75.00
11 Class "B" conc. for steps, headwalls & retaining walls	19 cy	55.00	60.00	50.00
12 Bit. bound stone base course at R. R. crossing	117 sy	1.80	2.00	3.50
13 Conc. sidewalk replaced	11 sy	2.50	3.00	3.00
14 Conc. paving, asphalt paving valley gutter & sidewalk removed	60 sy	.25	1.00	.50
15 Comb. conc. curb & gutter removed	420 lf	.40	1.00	.50
16 Conc. curb removed	570 lf	.10	.50	.30
17 Bar reinf. steel for culvert ext	0.3 tons	200.00	200.00	300.00
18 Castiron pipe installation for sanitary sewers—8′	1 ea	35.00	100.00	75.00
19 Standard brick manholes—4′ 0″ dia.				
(a) 0′ to 4′ deep	13 ea	105.00	100.00	150.00
(b) 4′ to 6′ deep	7 ea	120.00	125.00	180.00
(c) 6′ to 8′ deep	1 ea	145.00	150.00	200.00
20 Standard brick manholes—6′ 0″ dia.				
(a) 8′ to 10′ deep	1 ea	285.00	200.00	250.00
21 Catch basin, type "A"				
(a) 0′ to 4′ deep	34 ea	125.00	100.00	100.00
(b) 4′ to 6′ deep	10 ea	155.00	125.00	110.00
22 Catch basin, type "B"				
(a) 0′ to 4′ deep	4 ea	145.00	125.00	115.00
(b) 4′ to 6′ deep	1 ea	170.00	150.00	150.00
23 Special catch basin, Sta. 4+57, Church St	1 ea	175.00	150.00	100.00
24 Conc. catch basin extensions	35 lf	13.00	10.00	17.00
25(a) Sewer pipe—12″, 0′ to 4′ cut	2,020 lf	1.50	1.70	1.50
(b) 12″, 4′ to 6′ cut	183 lf	1.75	1.85	1.70
(c) 15″, 0′ to 4′ cut	318 lf	2.00	2.15	1.80
(d) 15″, 4′ to 6′ cut	477 lf	2.25	2.35	2.20
(e) 18″, 0′ to 4′ cut	228 lf	2.25	2.75	2.44
(f) 18″, 4′ to 6′ cut	222 lf	2.65	3.00	2.70
(g) 21″, 0′ to 4″ cut	331 lf	3.10	3.65	3.19
(h) 21″, 4′ to 6′ cut	533 lf.	3.35	4.00	3.40
(i) 24″, 0′ to 4′ cut	324 lf	3.10	4.40	3.74
(j) 24″, 4′ to 6′ cut	42 lf	3.35	4.70	4.00
(k) 42″, 0′ to 4′ cut	45 lf	10.00	11.15	11.20
(l) 42″, 4′ to 6′ cut	15 lf	10.00	11.65	12.00
26 Cast iron manhole covers & frames—460 lb	27 ea	36.80	50.00	75.00
27 Adjusting existing structures to grade	52 ea	20.00	10.00	25.00
28 Existing structures removed	23 ea	10.00	20.00	100.00
29 Connections to existing struct	3 ea	15.00	20.00	100.00
30 Exist. sewer pipe & culvert pipe removed (all sizes)	1,300 lf	.50	1.00	1.00
31 Ditch excavation	160 cy	1.50	1.00	1.00
32 Rip rap	90 sy	1.50	5.00	5.00

Watermain, Jefferson, Ga.

OWNER: Jefferson, Ga.; J. R. Bracewell & Assoc., engrs.

PROJECT: Installation of 23,075 linear feet of 2 in., 6 in. and 8 in. cast iron pipe mains and gate valves; replacement of 250 linear feet of paving. Project includes outside piping and drains around filtration plant.

CONDITIONS: City of Jefferson furnished 3,000 linear feet of 6 in. pipe to be purchased by general contractor. Access to job site is by rail and highway. Stipulated contract time is 180 days. Skilled labor wage rate is $2.00 per hour; semi-skilled, $.85; and common, $.75.

BIDS: Six bids were received, ranging from the contract low of $46,973 awarded Aug. 12, 1947 to $62,000.

LIST OF BIDDERS:

1. M. G. Aldridge, Macon, Ga.	$46,973
2. J. B. McCrary Engineering Corp., Atlanta, Ga.	49,315
3. E. N. Murray, Buena Vista, Ga.	49,555
4. W. C. Shepherd, Atlanta, Ga.	50,576
5. C. Y. Thomason, Greenwood, S. C.	52,916
6. A. H. Guion, Charlotte, N. C.	62,000

Item	Quantity	Unit Prices (1)	(2)	(3)
1 Outside pipe & drain	lump sum	$1,854.00	$1,425.00	$1,200.00
2 Cast iron pipe, 8″	2,000 lf	3.00	2.95	3.00
3 Cast iron pipe, 6″	13,650 lf	2.05	2.20	2.20
4 Cast iron pipe, 2″	6,525 lf	.85	.96	1.00
5 Gate valve & roadway box, 6″	17 ea	50.00	52.00	60.00
6 Gate valve & roadway box, 2″	8 ea	70.00	76.00	80.00
7 Special casting	5 ton	220.00	225.00	300.00
8 Paving taken up and replaced	250 lf	1.00	2.00	1.00
9 Fire hydrants	26 ea	110.00	98.00	100.00
10 Excavation for trenches, per ton	25 cy	10.00	15.00	6.000

Highway Improvement, Utah

OWNER: State Road Commission, Salt Lake City, Utah; Roy W. McLeese, State Road Engineer.

PROJECT: Construction of 9.271 miles of 3-in. plant mixed bituminous surfaced road between Box Elder County Line and Wellsville in Cache County.

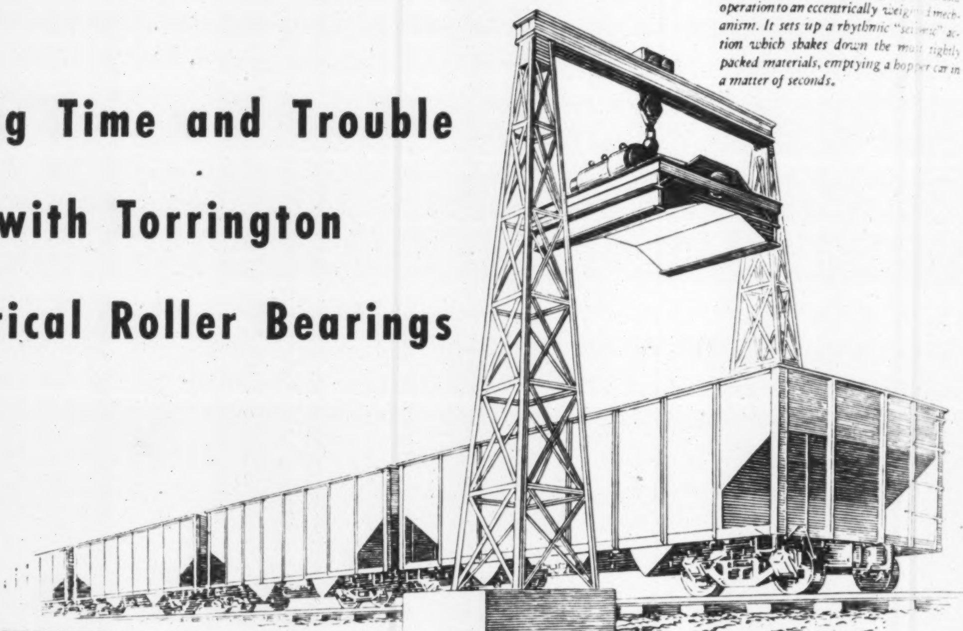
CONDITIONS: All materials are to be furnished by the contractor. Stipulated contract time is 250 working days. Access to job site is by highway. Skilled wage rate ranges from $1.50 to $1.75 per hour, semi-skilled from $1.00 to $1.50; common wage rate is $.875 per hour.

BIDS: Seven bids were received, ranging from the contract low of $183,541 awarded Sept. 17, 1947 to $230,177.

LIST OF BIDDERS:

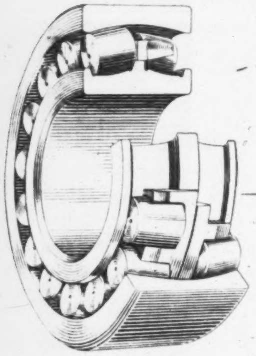
1. Parson & Fife Const. Co., Brigham City, Utah	$183,541.00
2. W. W. Clyde & Co., Springville, Utah	190,797.50
3. Carl E. Nelson Co., Logan, Utah	193,473.00
4. Olof Nelson Const. Co., Logan, Utah	206,504.00
5. Palfreyman Const. Co., Provo, Utah	217,582.90
6. Reynolds Const. Co., Springville, Utah	218,035.00
7. L. T. Johnson Const. Co., Ogden, Utah	230,177.00

Item	Quantity	Unit Prices Engineer's Estimate	(1)	(2)
1 Plant Mixed Bituminous Surfacing	26,000 ton	$2.30	$2.15	$2.20
2 Bituminous Material, 200–300 Pen.	280,000 gal	.12	.115	.12
3 Bituminous Material, Type MC-1	80,000 gal	.14	.125	.13
4 Bituminous Material, Type RC-4	40,000 gal	.14	.13	.135
5 Cover Material	2,000 ton	2.50	2.50	2.50
6 Cr. Rock or Cr. Grav. Surf. Course	46,000 ton	.75	.58	.64
7 Gravel or Crushed Rock Base Course	52,000 ton	.70	.56	.58
8 Embankment Protector	1 ea	25.00	50.00	20.00
9 Guard Rail	5,330 lf	2.25	2.50	1.25
10 Guide Posts	101 ea	4.50	4.00	7.00
11 8″ C. G. M. Pipe (Soldered Joints)	96 lf	1.50	2.00	1.75
12 Resetting Guard Rail	900 lf	1.50	1.50	1.50
13 Watering	1,120 1000 gal	2.00	1.25	1.75
14 Rolling	680 hr	5.00	4.00	5.00



In the Robins Car Shakeout two Torrington Spherical Roller Bearings provide smooth operation to an eccentrically weighted mechanism. It sets up a rhythmic "seismic" action which shakes down the most tightly packed materials, emptying a hopper car in a matter of seconds.

Saving Time and Trouble with Torrington Spherical Roller Bearings



. . . one of many advantages of this Torrington Bearing is long service it gives with minimum attention required.

THE ROBINS CAR SHAKEOUT saves time by unloading hopper bottom railroad cars in the twinkling of an eye . . . saves trouble by maintenance-free operation on Torrington Spherical Roller Bearings. The manufacturer found another advantage – while welded construction makes it difficult to line up the bearing housings, perfect bearing alignment is secured through their self-aligning feature. These and other benefits add up to dependable operation, minimum power input, low lubrication cost and no down-time.

These are only a few of the features you can gain by equipping cranes, hammer mills, conveyors, shaker screens, rock crushers and earth moving and handling equipment with Torrington Spherical Roller Bearings.

When you are faced with a friction problem, consult Torrington's engineers, who have had years of specialized experience in the design, construction and application of all types of anti-friction bearings. Call or write the nearest Torrington office.

THE TORRINGTON COMPANY
South Bend 21, Ind. • Torrington, Conn.
District Offices and Distributors in Principal Cities

TORRINGTON BEARINGS

SPHERICAL ROLLER
TAPERED ROLLER
STRAIGHT ROLLER
NEEDLE
BALL
NEEDLE ROLLERS

New Aids to the Constructor

MANUFACTURERS' LATEST DEVELOPMENTS IN EQUIPMENT AND MATERIALS

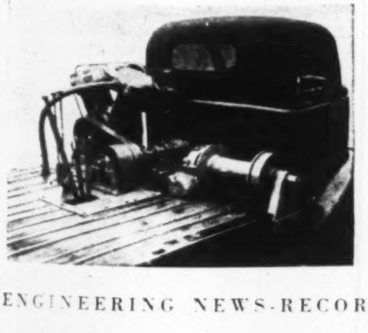
(Number refers to item directly below it)

28

BULLDOZERS—Three new type heavy-duty bulldozers, especially designed for Case industrial wheel tractors, are now being manufactured by the American Tractor Equipment Corp. These bulldozers cut the full width of tractor; bowl design is the same rigid, internally-ribbed, welded box as is used for big track-type tractors. The bulldozer is securely fastened at the transmission case, drawbar pad and rear axle housing. Bowl and push members are built to take full drawbar power of the Case tractor in the roughest kind of work. The blade is powered both up and down by front-mounted hydraulic pump which assures constant power without gear shifting.—*American Tractor Equipment Corp.*, 9131 *San Leandro Blvd., Oakland* 3. *Calif.*

29

COMPRESSOR-WINCH ASSEMBLY—Power for operation of truck-mounted compressor and winch is transmitted from truck engine by heavy-duty power take-off in truck's driveshaft. Countershaft with two individual Twin Disc clutches provides for either simultaneous or separate operation of compressor and winch. Compressor is standard Davey Model 105-VC Auto-Air and delivers 105 cfm. at 100 lb. pressure. Winch is of 25,000-lb. capacity. Air receiver and double hose reels are mounted beneath truck platform. Unit extends only 40 in. behind truck cab and is 38 in. high.—*Truck Equipment Division, Davey Compressor Co., Kent, Ohio.*



30

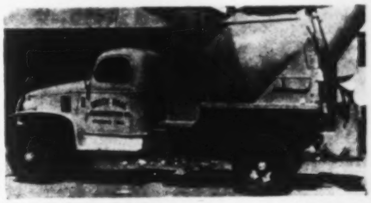
ROTARY PLOW—A New Rotary snow plow, called the SnoMaster, has been announced by the Iowa Mfg. Co. The plow is a self-contained unit that can be attached to or detached from almost any 2½ to 5 ton four-wheel drive truck. No extra power unit is needed and no special transmission is required. Rotary picks, driven by chains and suspended by springs in front of the plow can be raised or lowered by hydraulic controls in the truck cab to break down drifts or cut away frozen snow on the ground. The 18-in. auger is ball bearing mounted and driven through a shear pin flange for safety. Rotor is a disc with six blades of special steel and provided with a shear pin.—*Iowa Mfg. Co., Cedar Rapids, Iowa.*

31

RADIAL SAW — Cut-Master model, available in 3, 5 and 7½-hp. sizes for any voltage, cycles and phase, has easily visible, single degree calibrated scale for miter, rip and bevel cutting. New kickback device features multiple dogs, which can be put into operation with simple flick of wrist for safety in ripping. Front elevation mechanism with adjustable crank handle is conveniently located in front of operator. Start-stop switch control is deeply recessed on front end of machine arm. Wide work table provides ample working space for easier handling of materials or in set-ups for "gang" cutting operations. Machine is powered with new DeWalt-built, direct drive motor, which is wound with Formex Fiberglas insulation, furnished with grease-sealed-for-life bearings that require no lubrication, and installed in heat-treated aluminum case.—*DeWalt, Inc.*, 63 *Fountain Ave., Lancaster, Pa.*

32

HIGH DISCHARGE TRUCK MIXER—Hi-Boy Truckmixer, high discharge type, is now in production by Blaw-Knox in addition to horizontal Hi-Boy model. Hi-Boy is made in standard sizes of 2, 3 and 4½ cu. yd.; corresponding capacities when used as agitator are 3, 4½ and 6⅛ cu. yd. Mixer reportedly discharges rapidly without segregation and will handle low slump concrete. Revolving hopper for both charging and discharging permits gadget-free and streamlined rear end. Hopper is supported directly from end of mixing drum cone and moves with drum as truck frame weaves under field operating conditions. Thus hopper remains in alignment with drum, which insures tight and enduring seal between hopper and drum, preventing leakage



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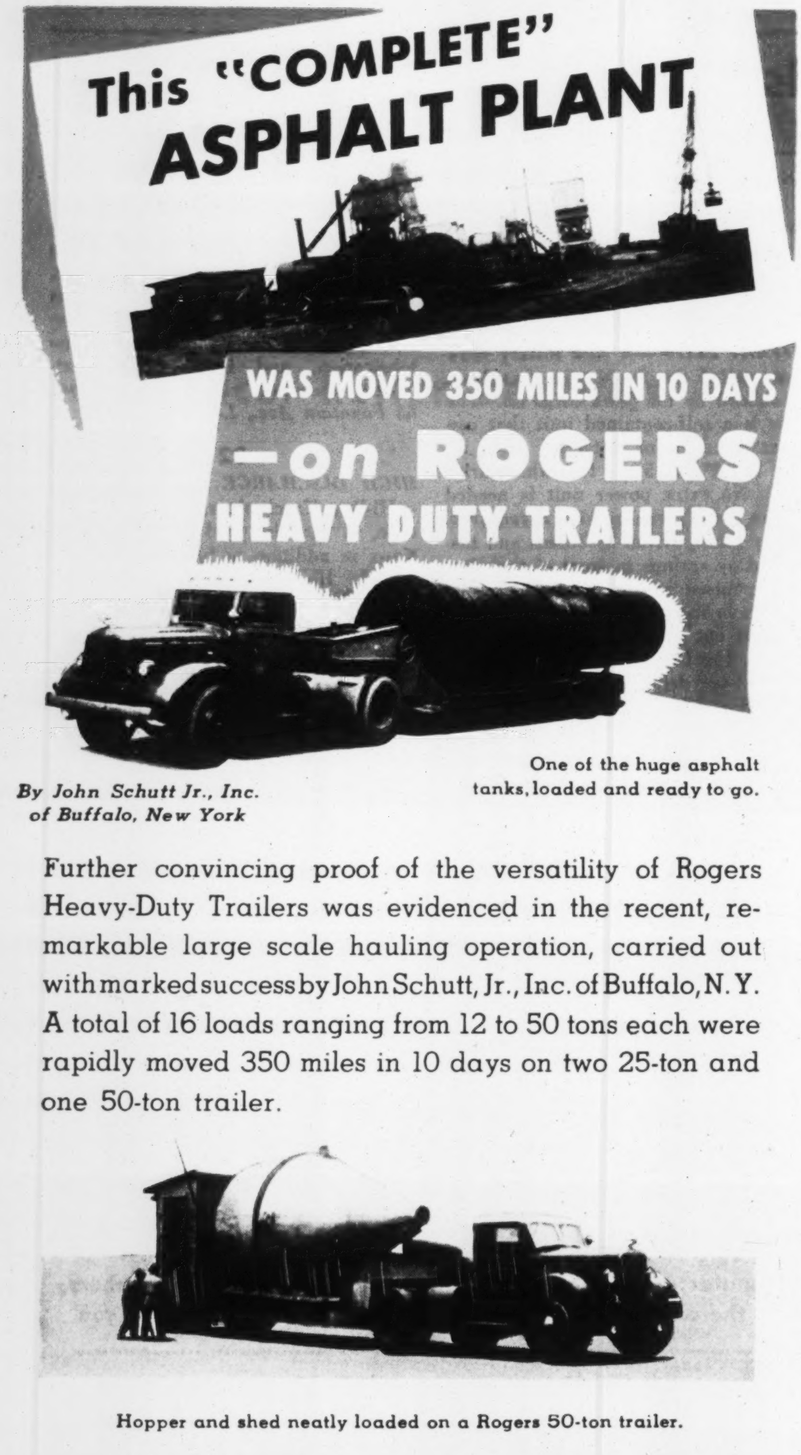


This "COMPLETE" ASPHALT PLANT

WAS MOVED 350 MILES IN 10 DAYS —on ROGERS HEAVY DUTY TRAILERS

By John Schutt Jr., Inc. of Buffalo, New York

One of the huge asphalt tanks, loaded and ready to go.

Further convincing proof of the versatility of Rogers Heavy-Duty Trailers was evidenced in the recent, remarkable large scale hauling operation, carried out with marked success by John Schutt, Jr., Inc. of Buffalo, N. Y. A total of 16 loads ranging from 12 to 50 tons each were rapidly moved 350 miles in 10 days on two 25-ton and one 50-ton trailer.

Hopper and shed neatly loaded on a Rogers 50-ton trailer.

ROGERS BROS. CORP.

DESIGNERS and BUILDERS OF HEAVY DUTY TRAILERS SINCE 1915

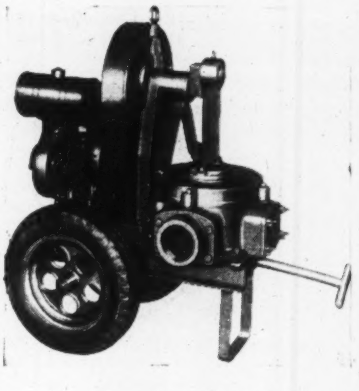
EXPERIENCE builds 'em PERFORMANCE sells 'em

135 ORCHARD ST. ALBION, PENNA.

of grout and reducing maintenance and repair. Hopper has 32-in. unrestricted opening into drum for fast charging. It latches automatically in charging or discharging position.—*Blaw-Knox Co., Farmers Bank Bldg., Pittsburgh 22, Pa.*

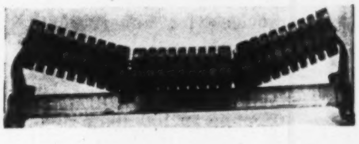
33

DIAPHRAGM PUMP—New pump is produced in 3 and 4-in. sizes with capacity from 1000 to 6000 gph. Only moving part exposed to gritty water is highly durable live-rubber diaphragm. Timken roller bearings are used on pump rod and in main transmission. Other features include accessibility of non-clogging valves for inspection or removal, completely inclosed transmission, large water passage for free flowage, and easy clean-out hand hole. Recommended for suction lifts up to 20 ft., it has maximum lift of 25 ft. Available with gasoline engine, electric motor or without power source, pump is mounted on rubber-tired, two-wheel truck.—*Carver Pump Co., Muscatine, Iowa*



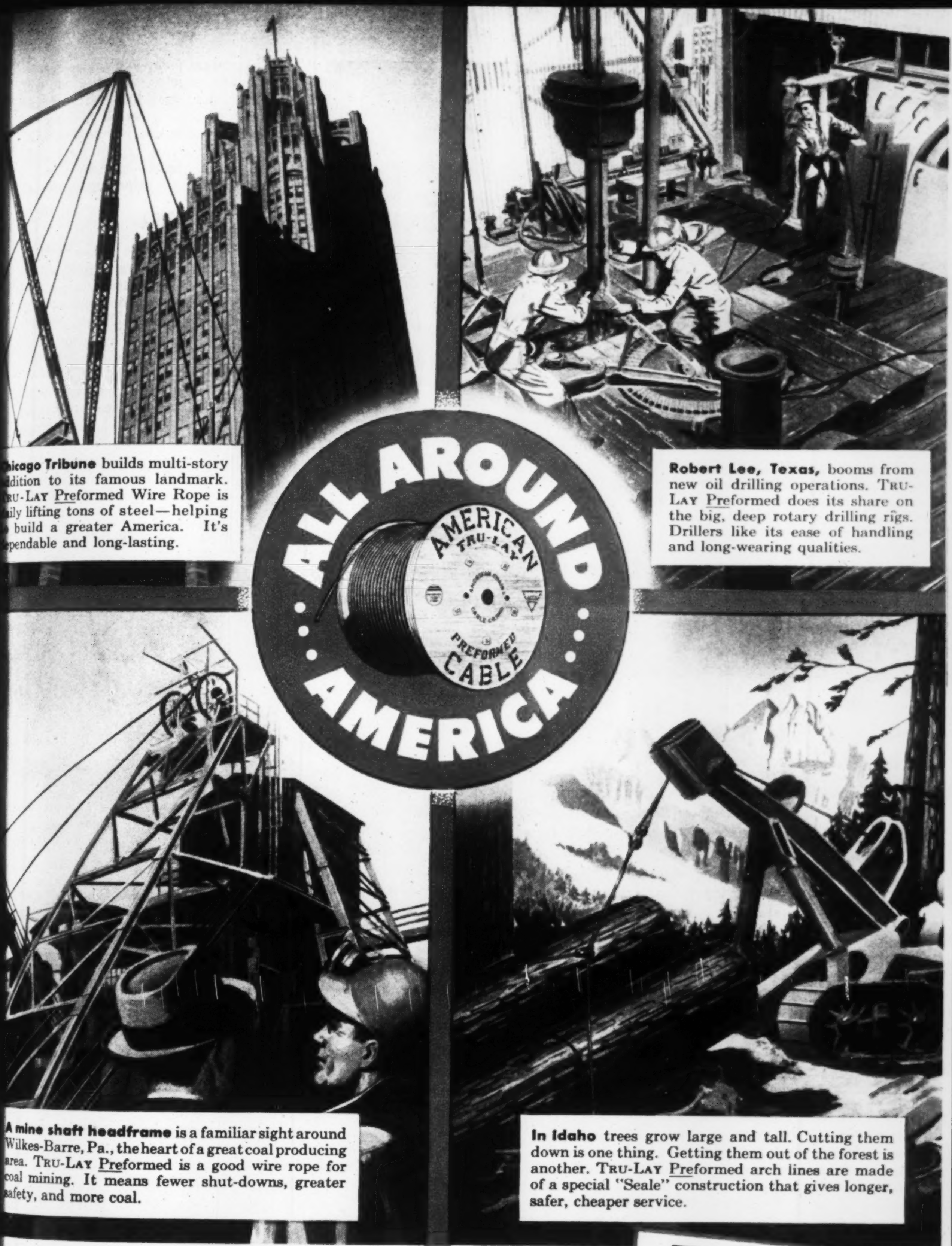
34

IDLER FOR BELT CONVEYORS — New type impact-cushioning non-pneumatic idler consists of rubber rings mounted on idler core. High resiliency of rubber rings solves impact problem by decelerating lump. It is said to increase belt life materially.—*Goodyear Tire & Rubber Co., Akron, Ohio*



35

STREET FLUSHER—The Rosco Mfg. Co. has announced the addition of a new product to its line of road and street maintenance equipment—a fully skirted, ultra-streamlined street flusher. The new machine will include such features as one master directional flow control valve to control one or all flushing



hicago Tribune builds multi-story ddition to its famous landmark. ru-Lay Preformed Wire Rope is ily lifting tons of steel—helping o build a greater America. It's ependable and long-lasting.

Robert Lee, Texas, booms from new oil drilling operations. Tru-Lay Preformed does its share on the big, deep rotary drilling rigs. Drillers like its ease of handling and long-wearing qualities.

A mine shaft headframe is a familiar sight around Wilkes-Barre, Pa., the heart of a great coal producing area. Tru-Lay Preformed is a good wire rope for coal mining. It means fewer shut-downs, greater afety, and more coal.

In Idaho trees grow large and tall. Cutting them down is one thing. Getting them out of the forest is another. Tru-Lay Preformed arch lines are made of a special "Seale" construction that gives longer, safer, cheaper service.

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Preformed
Wire Rope

more **RUGGED** than **ROCK...**

For earth moving and material handling, the Twin Disc Model EH Clutch incorporates all the ruggedness that can be built into a clutch designed for heavy-duty service. In addition, these clutches provide easy engaging action, minimum overall dimensions, and maximum bores for oversize shafts. All moving parts are constructed and tested to insure accurate, statically balanced conditions.

Model EH Clutches are supplied with gear tooth drives for easy assembly. Readily attachable driving rings can be furnished for use with flywheels, drums and pulleys. Driving spiders can also be supplied with two types of hubs on sizes through the EH 324.

Twin Disc Model EH Clutches are available in single, two, or three-plate construction. Sizes range from 14″ to 42″ . . . working capacities from 65 to 875 hp. For complete specifications and engineering information, write for Bulletin 108-D. TWIN DISC CLUTCH COMPANY, Racine, Wisconsin (Hydraulic Division, Rockford, Illinois).

Reduction Gear

Hydraulic Torque Converter

Machine Tool Clutch

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CLUTCHES AND HYDRAULIC DRIVES
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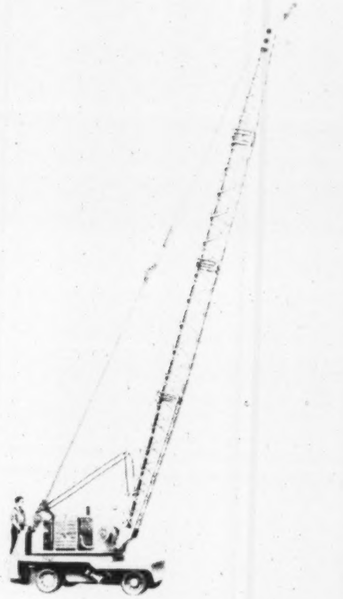
SPECIALISTS IN INDUSTRIAL CLUTCHES SINCE 1918

nozzles; larger pump and engine capacity; more flushing pressure at the nozzles; and durability features. In addition to high pressure flushing of streets, this unit can be used to fight fires, clean sewers, spray trees and shrubs, and pump out basements.—*The Rosco Mfg. Co., Minneapolis, Minn.*

36

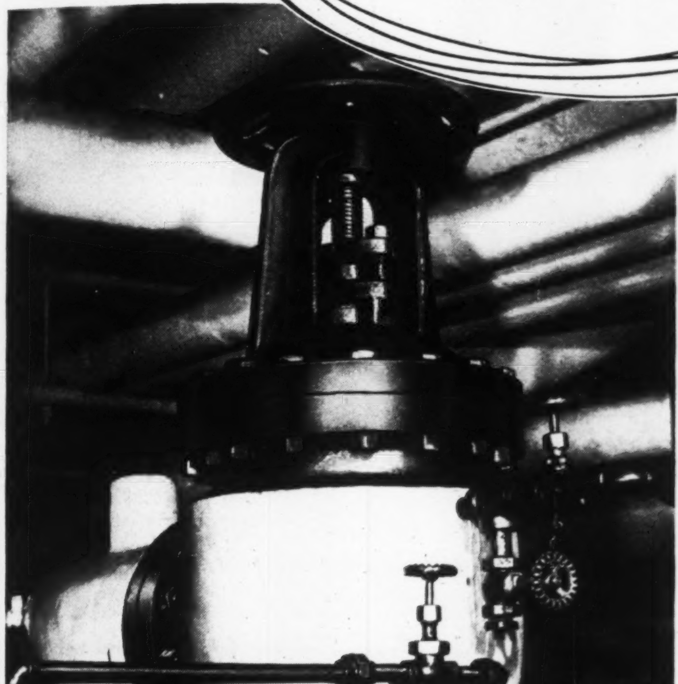
CRANE TRUCK—Yale & Towne Mfg. Co. announces a new crane truck with a full 40 ft. reach, designed especially for use in the construction and maintenance of high buildings. The equipment is also said to be valuable in lifting material into and out of excavations; loading and unloading ships and rail cars; maintenance and construction of railways, and odd hoisting and transportation jobs. The 40 ft. boom is constructed in 10-ft. sections, with center sections removable to provide 20-ft. and 30-ft. booms when longer lengths are not needed. Capacities of the boom at full length are: 4500 lb. at 7 ft. outreach; 3620 lb. at 9 ft. and 2000 lb. at 19 ft. The boom has a capacity of 10,000 lb. at its shortest length.—*Yale & Towne Mfg. Co., Philadelphia (A) Division.*



37

JEEP-MOUNTED WELDER—Standard P&H Model WG-200 welding generator is coupled to rear power take-off of Willys jeep. Pulleys of proper ratio permit jeep engine to operate at approximately 1,500 rpm. This speed enables generator to operate at peak efficiency over its welding range, from minimum to maximum. V-belts are used in hookup. Four bolts hold generator in place on rear of jeep, making it easy to remove. Generator provides

1 of 17



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Valves

Installed in Boiler Room
of Merchandise Mart

Chicago, Illinois

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(1) Cut in a boiler whenever its pressure equals line-header pressure.

(2) Isolate a boiler whenever its pressure, from any cause, is lower than line-header pressure.

(3) Prevent steam flow from boiler pressure by means of differential shot pilot valve functioning.

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GENERAL MOTORS

. . . and in this addition to General Motors' Harrison Radiator Division, Lockport, N. Y.

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. . . and in the new Dayton, Ohio plant for Chrysler Corporation's Airtemp Division

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Ingalls fabricated steel is the framework for many of the nation's new and expanded manufacturing plants. Steel bearing the Ingalls label is thoroughly dependable. Formed to exact specifications, it requires a minimum of cutting or fitting on the job.

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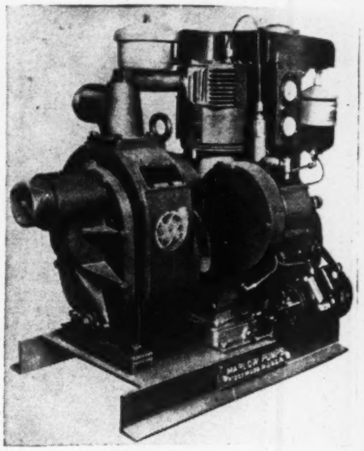
welding service range of from 30 to 260 amp. and has just one heat control for all classes of work and all types of electrodes.—*Welding Division, Harnischfeger Corp.*, 4400 *W. National Ave., Milwaukee* 14, *Wis.*

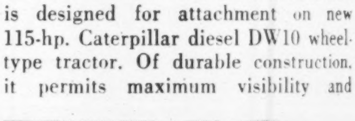
38

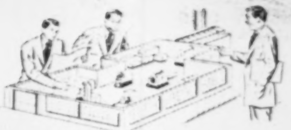
DIESEL POWERED PUMPING UNIT —This 220-gpm. self-priming centrifugal pump is powered by smallest diesel engine available—single-cylinder air-cooled Sheppard, rated at 3½ continuous hp. at 1,800 rpm, and equipped with electric starting. One gallon of domestic fuel oil will pump 36,500 gal. of water.—*Marlow Pumps, Ridgewood, N. J.*



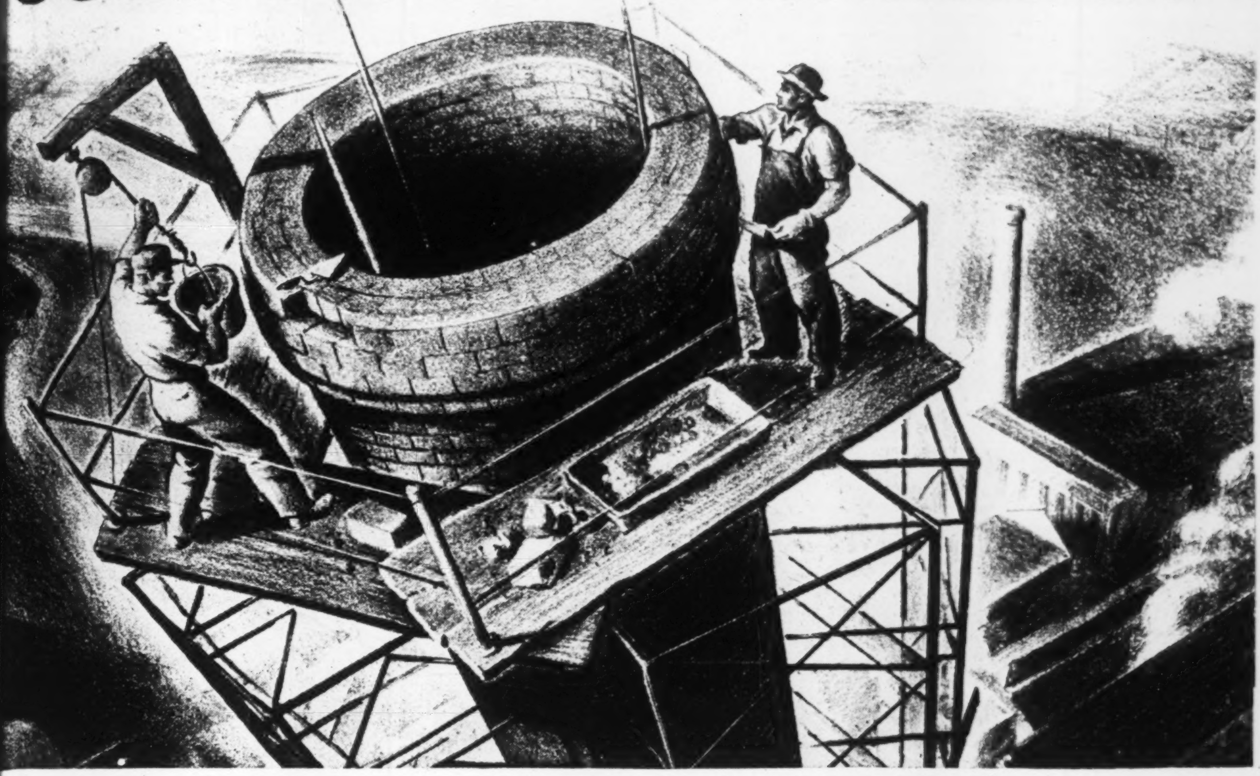
39

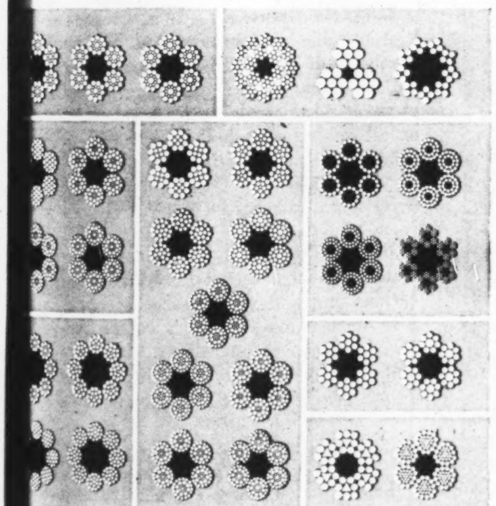
TRACTOR CAB—All steel welded cab is designed for attachment on new 115-hp. Caterpillar diesel DW10 wheel-type tractor. Of durable construction, it permits maximum visibility and maneuverability for operator, while giving increased comfort and complete weather protection. Door and side and rear panels are removable.—*Caterpillar Tractor Co., Peoria* 8, *Ill.*





Confidence- WITH ITS SLEEVES ROLLED UP!





STRAIGHT AND STALWART, every factory stack is a towering symbol of man's faith in the future . . . industry's confidence in its ability to create and to expand production for better living and a richer world.

With confidence like that, Roebling has pioneered in developing and making an extraordinary range of products indispensable to industry. And the confidence that its products and engineering skill have earned in every industrial field is one of Roebling's most valued assets. Every Roebling employee is striving to safeguard that confidence by making products and rendering services that are of maximum utility to you.

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Through many years of actual service the JACKSON HS-A1 has thoroughly demonstrated that it is the most dependable and efficient, all-around concrete vibrator for the general concrete contractor. It's virtually trouble-free and does a perfect job of handling the stiffer, more economical mixes. Oil-powered, gas engine-hydraulic pump drive. 4000 to 7000 V.P.M. Vibrator head 2¾" x 21". May be quickly fitted with head for wet or dry rubbing.

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LUDINGTON MICHIGAN

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BITUMINOUS DISTRIBUTORS

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Manufacturers' Publications

40

Steel Wall Forms—(25-p. booklet) Gives instructions for erection and maintenance of Atlas Speed forms, showing step-by-step procedure for usual-type job from cleaning of footings through stripping and preparation for re-use. Included are 49 pictures and sketches of erection in various stages. *—Irvington Form & Tank Corp., 19 Park Place, New York 7, N. Y.*

41

Belt Conveyors — (160-p. catalog) Provides complete selection of standardized belt conveyor units, so indexed and classified that reference to proper tables makes it easy to determine correct conveyor to suit given need. Complete line of anti-friction idlers is also listed.—*Jeffrey Mfg. Co., Columbus 16, Ohio.*

42

Valves—(12-p. folder) Describes new 270-U Bronze Gage valve with Monel seat rings, as well as 34 other valves with pressure ratings and size ranges.—*Jenkins Brothers, 80 White St., New York 13, N. Y.*

43

Concrete Plants — (32-p. booklet) Presents pertinent information, with 60 photos and 30 illustrations, on laying out stationary and mobile concrete plants. Also available is 8-p. booklet on all-welded clamshell buckets.—*C. S. Johnson Co., Champaign, Ill.*

44

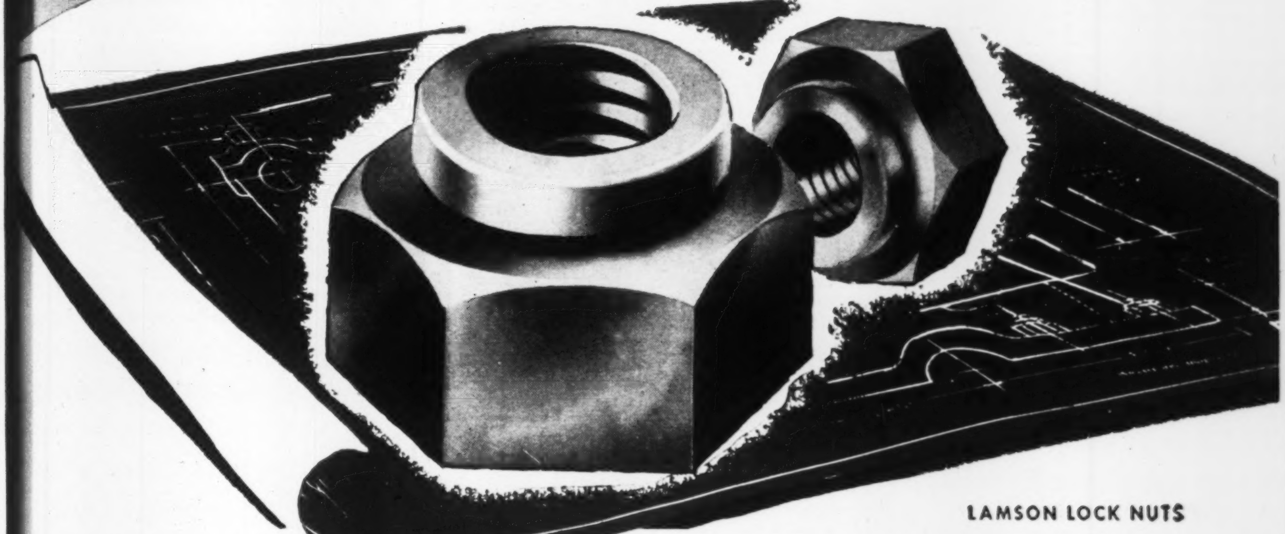
Boring Tools—(6-p. folder) Illustrates typical industrial boring applications and lists performance of Kwik-Size boring tools through comprehensive sequence of operations. It covers full range of boring head sizes.—*Kaukauna Machine Corp., Kaukauna, Wis.*

45

Suspended Ceiling—A new catalog describes the Nailock Method of suspended ceiling construction which provies a means of mechanical fastening for acoustical ceiling materials. The method is also used for fastening other nailable materials to steel, concrete and masonry. Detailed descriptions accompanied by illustrations and details

(*Continued on page 114*)

may we "Butt in" on your Blueprints nd perhaps solve your Fastener Problems?



LAMSON LOCK NUTS

YOU have high hop [illegible] that new product of yours. It has what it takes to succeed in a big way. Utility, sales appeal and it's priced right. Your engineers and designers have seen to that.

But how are you going to assemble it most efficiently? What *types* of nuts and bolts and screws will do the job *right* . . . and at *lowest cost?* For instance, will you be able to use so-called "STANDARD" fastenings . . . types that are used on thousands of other products? Or will your new product require one or more "SPECIAL PURPOSE FASTENINGS" . . . such as the all-steel, one-piece Lamson Lock Nut illustrated above, or one of the products on the opposite page?

Choosing the proper fasteners for a product is an exact science in itself. It takes a whale of a lot of "know how" to select, out of the thousands of fasteners available, the particular one which meets all your requirments economically.

Whenever you are faced with a problem involving the proper choice of bolts, nuts, screws or allied products, LAMSON & SESSIONS invites your inquiry, without obligation. As one of the largest bolt and nut manufacturers in the United States, backed by 81 years' experience in the industry, we are in an excellent position to solve your fastener problems quickly—in fact, the answer may already be in our files.

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TS • BARREL NUTS • OBLONG NUTS • CABINET BED BOLTS

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UTS

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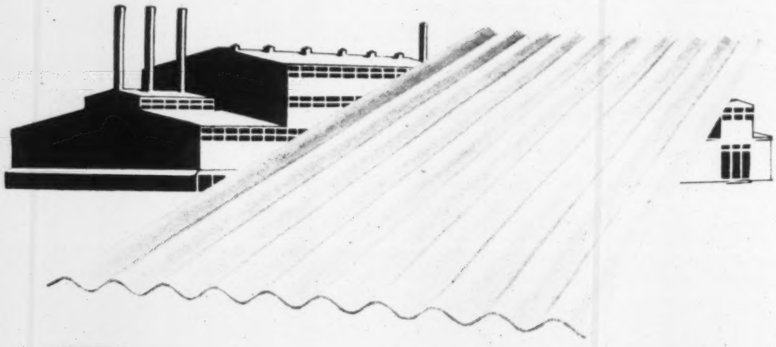
PPIN

• WEATHER TIGHT

IPS SCREWS • CAP SCREWS • FIN HEAD

Planning a
Chemical Plant
Oil Refinery
Paper Mill
...or an addition?



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—the lifetime roofing and siding that's fireproof and corrosion-proof. Asbestone can't be damaged by weather, rats, or termites. No painting. No upkeep.

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CALIFORNIA OIL CO.
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ETHYL CORPORATION
FREEPORT SULPHUR CO.
NEW ORLEANS PUBLIC SERVICE
MOBILE PAPER MILL CO.
CROSBY CHEMICALS, INC.
STANDARD OIL OF N. J.
UNIVERSAL ATLAS CEMENT CO.

Why we can assure you early delivery
We are concentrating on production of this single industrial product. Stocks are now ample to make some immediate shipments. Free Engineering Service available on request, shows how Asbestone can be adapted to your needs.

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5300 TCHOUPITOULAS STREET NEW ORLEANS 15, LA.
Specialists in Asbestos-Cement Building Products for over 25 Years

showing how the channels are installed to various types of construction are included.—*The Sanymetal Products Co., Inc., 1705 Urbana Road, Cleveland 12, Ohio.*

46

Batching Plants—Advantages and condensed specifications for Noble batching plants are described in four illustrated four page folders just released. A separate folder is devoted to each of the four plant sizes: 80, 100, 150, and 350 tons. Plan drawings and photographs of field installations are included for each model.—*The Noble Co., 1860-7th St., Oakland 7, Calif.*

47

Electrode Selection—Complete listing of all P&H electrodes in all types including mild steel, alloy steels, stainless steels, for welding cast iron and for hard surfacing, is now available. Includes the AWS or AISI classifications in accordance with NEMA color chart, physical properties and sizes available, and a description of the general characteristics of each electrode.—*Harnischfeger Corp., Milwaukee, Wis.*

48

Cable Connections—Two new Tweco Products literature releases include a new 12 page Twecolog, fully describing the complete line of Tweco welding electrode holders, ground clamps, cable connectors, machine terminals, cable splicers, lugs and carbon holders. Quantity price and parts information is included, and the bulletin shows new models.—*Tweco Products Co., Wichita 1, Kan.*

49

Materials Handling Equipment—(86-p. catalog) Contains data and large-size illustrations of each type of equipment, with installation photos. Cover has special filing tab for quick visual reference.—*Lewis-Shepard Products, Inc., 290 Walnut St., Watertown 72, Mass.*

50

Shovel, Crane and Dragline—(24-p. bulletin) Describes Type 604 shovel, crane and dragline, with illustrations showing details of construction and operating advantages.—*Lima-Hamilton Corp., Lima, Ohio.*

51

Two-Wheel Scraper—(4-p. bulletin) Describes and illustrates new scraper and tractor combination and features special hitch assembly which transfers scraper weight to tractor driving wheels.

(*Continued on page 118*)

How to specify Industrial Flooring that will please everybody!

I. "The floors shall be Industrial Asphalt Mastic"

NOTE: Industrial Asphalt Mastic Flooring mixtures are made by mixing Flintkote Flooring Emulsion in the proper proportions, as called for in the specifications, with sand, crushed stone or gravel, a setting agent and clean water.

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Architects and engineers like these flooring specifications because they mean a satisfactory, durable floor that satisfies their clients.

Building contractors like them, because Mastic Floors made with Flintkote Flooring Emulsions are easy to lay . . . either for work areas, or as underlayment for decorative flooring. Special Electric Power Floats speed large jobs.

Management likes these Mastic Floors because they are equally efficient either for new construction or for resurfacing. They'll take heavy moving or standing loads without undue wear. And because Mastic Floors heal themselves of minor scars and rutting . . . because they're easy to patch and repair . . . maintenance costs are low.

The warmth and resilience of Mastic Floors made with Flintkote Flooring Emulsions provide an ideal "working surface," with plenty of foot-comfort for standing operators. For complete details and specifications, see Sweets, or write us for full information and application data.

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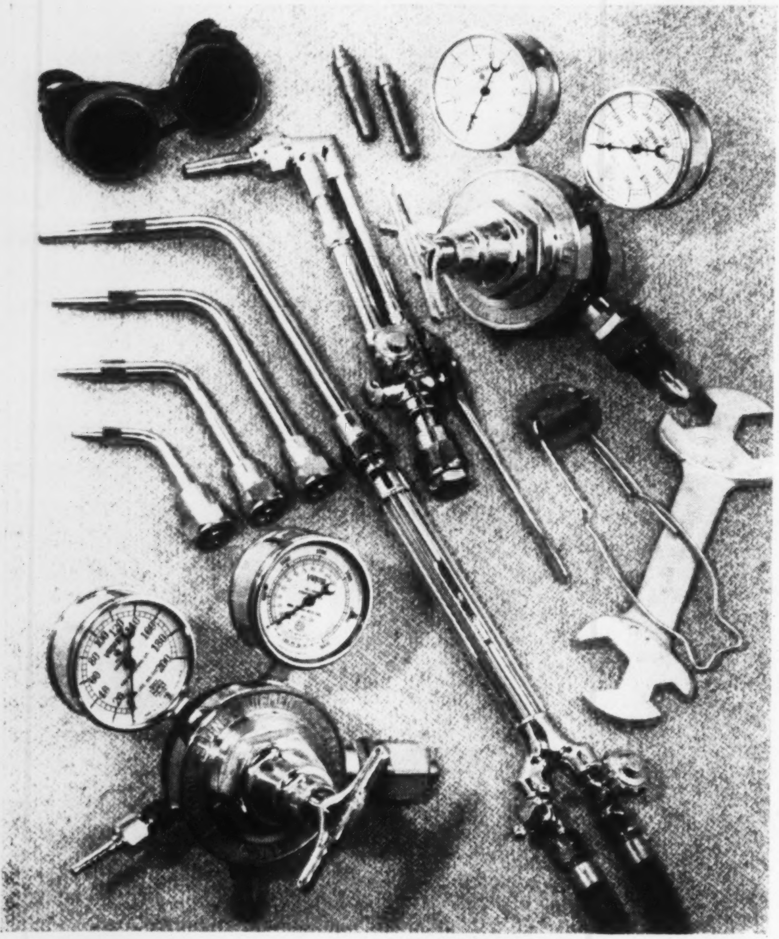

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on the construction job, particularly, a good gas welding and flame cutting outfit is a necessity. on a construction job, however, such an outfit is used largely for emergency repair, for hard facing, for silver brazing and for flame cutting—such an outfit, therefore, must be dependable . . . on the job when needed. and—that quality is one of the numerous reasons why victor welding and cutting equipment is today the most popular and one of the most highly regarded in industry.

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Company has also issued new specification sheets on its lines of landleveling scrapers, bulldozers, roadbuilders and hydraulic pump, valve and tank assemblies. — *American Tractor Equipment Co., 9131 San Leandro Blvd., Oakland 3, Calif.*

52

Radiant Heating — (12-p. booklet) Carries results of engineering analysis of 1,000 radiant heating installations, providing closeup view of status of radiant heating today, types of buildings in which it is most frequently used, and engineering preferences in design and fabrication. — *A. M. Byers Co., Pittsburgh, Pa.*

53

Bulldozers — (16-p. booklet) Illustrates versatility of cable controlled bulldozer mounted on various models of diesel track-type tractors. Summaries of jobs are given. Company has also issued 12-p. booklet on pipeline construction, 16-p. bulletin on off-track equipment in railroad service, and 8-p. booklet on rubber-tired equipment.— *Caterpillar Tractor Co., Peoria 8, Ill.*

54

Steelframe Construction — (Research study) Describes test results on Pierce house, with detailed explanation and discussion of structural and thermal tests made on lightweight steel construction system for small homes. It is based on Pierce system of horizontal construction, which is described and compared with more conventional building methods. Priced at 50 cents.— *John B. Pierce Foundation, Raritan, N. J.*

55

Door-Frame Assembly — (8-p. booklet) Describes new metal door-frame assembly for use with Herculite glass doors, showing 12 available styles and giving dimension tables.—*Pittsburgh Plate Glass Co., 632 Duquesne Way, Pittsburgh, Pa.*

56

Fire Brick and Refractories — (32-p. catalog) Includes complete tables for all sizes of refractory bricks so that brick estimates for any building relining, repairing or rebuilding job can be rapidly figured. Castable refractories, bonding mortars, fire brick, silica brick, patching mortars and acid-proof cements are throughly covered.—*Robinson Clay Product Co., Second National Bldg., Akron 9, Ohio.*

Men and Jobs

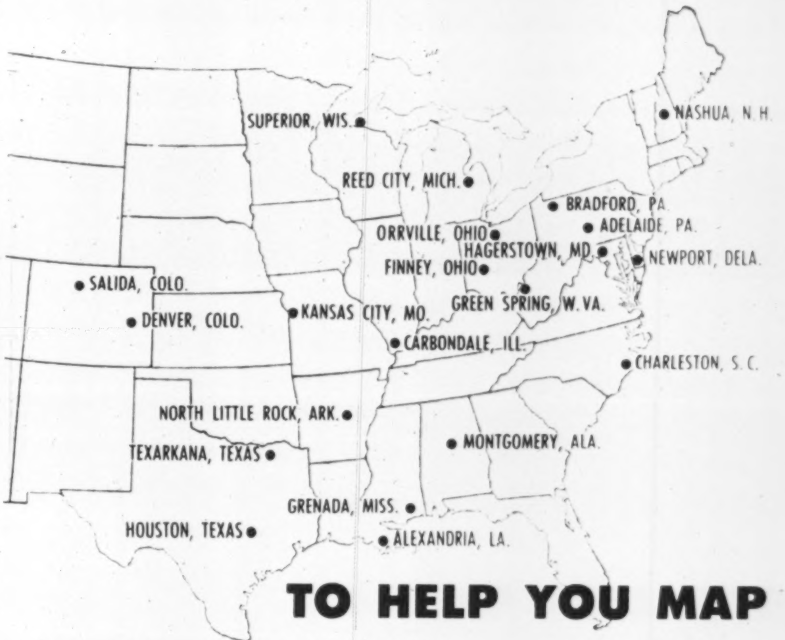
George H. Anderson has been appointed engineer of structures for the New England Power Service Co., Boston, Mass. He was graduated from Worcester Polytechnic Institute in civil engineering in 1920. After being with the McClintic-Marshall Construction Co. and the Pennsylvania Railroad, Mr. Anderson joined the then Power Construction Co., Worcester, Mass., in 1921, becoming chief draftsman in 1927. Later he was a member of the engineering staff with headquarters at Boston. He has been closely identified with hydroelectric construction for the New England Power System, now the New England Electric System, on developments on the Deerfield and Connecticut Rivers. During 1944 Mr. Anderson was loaned to the Office of Scientific Research and Development and engaged in war apparatus development and testing for the U. S. Navy.

John B. McMorran, former assistant district engineer at the Binghamton office of the N. Y. State Department of Public Works, has been made district engineer at Rochester. He is a civil engineer graduate of Syracuse University, 1922, and has always worked for the state in engineering capacities except for his war service in which he was promoted from private to lieutenant colonel, commanding the 841st Engineer Aviation Battalion.

G. Victor Walters has been appointed to head up the new asphalt division of the highways bureau of Baltimore, Md.

Announcement is made of the formation of a new partnership, to be known as Wiggs, Walford, Frost and Lindsay to carry on the practice of consulting engineers at 1411 Crescent Street, Montreal 25, Que., previously conducted by the firm of G. Lorne Wiggs and Co. The engineers forming the partnership are: **G. Lorne Wiggs, Leslie C. A. Walford, John G. Frost** and **Lorne Lindsay.**

William R. Seeger, former project manager of the engineering office of Clyde C. Kennedy, San Francisco, has



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been appointed assistant chief engineer of the Marin Municipal Water District, San Rafael, Calif.

Felix S. Hales, civil engineer from North Carolina State College, has been elected vice-president of the New York, Chicago and St. Louis Railroad Co., with headquarters in Cleveland, Ohio. He was graduated at N. C. State in 1913 and later served as an instructor there. In 1916 he joined the railroad company as a draftsman. From 1928 to 1931 he directed the railroad's $25,000,000 building program, involving the construction of new yards, freight facilities and grade eliminations. Following his college faculty work he was connected with Riddick and Mann, Raleigh, N. C., engineers, and with the Brett Engineering and Construction Co.

Harry A. Balke, consulting engineer, formerly with the American Bridge Co., has opened an office at 800 Broadway, Cincinnati, Ohio, for structural design and consulting service on steel and concrete bridges, buildings, foundations and unusual structures.

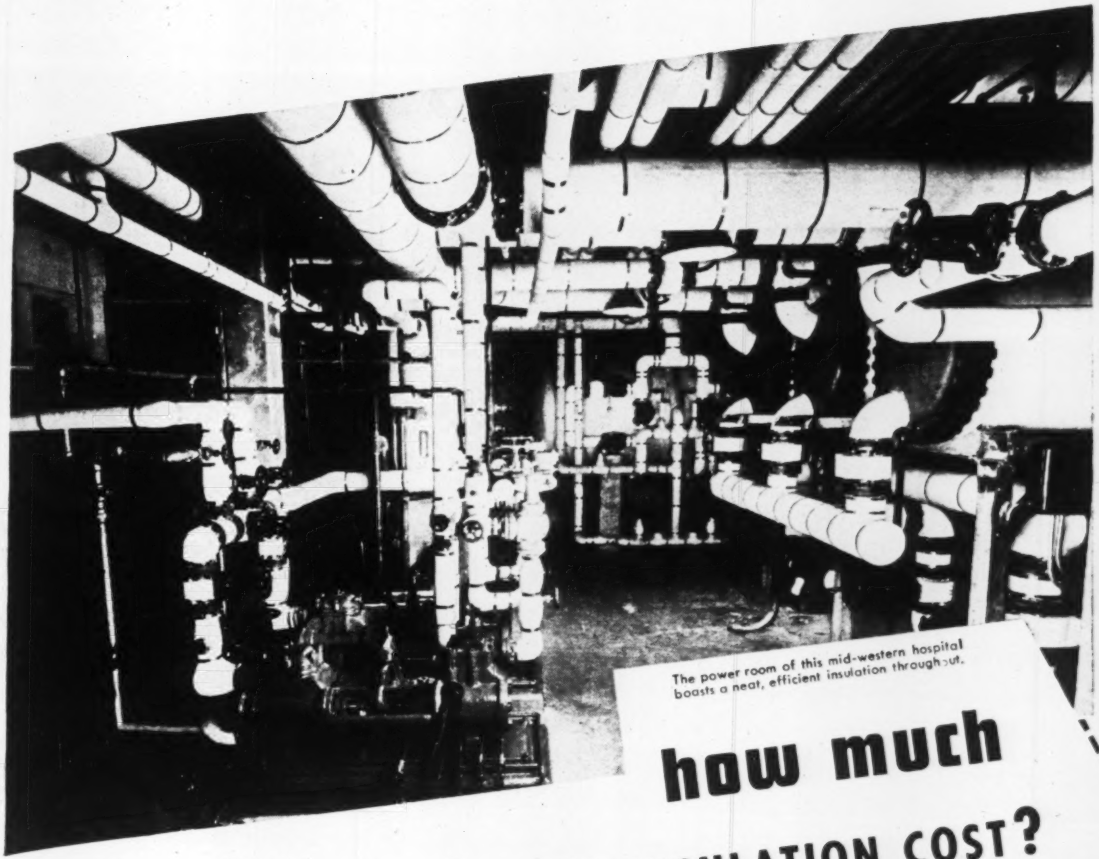
Robert J. Gibson, who has been assisting part time as Ringgold County engineer has been appointed county engineer at Mt. Ayr, Iowa.

A. D. Finch of West Union, Iowa, who has served as Fayette County engineer for 25 years, has resigned to join the Enders Tool Manufacturing Co. at Guttenberg, Iowa.

Charles E. Wells, for 14 years city manager of Albuquerque, N. M., until his resignation last October, has been named to the newly-created post of manager and chief engineer of the city water department. He was graduated from Colorado A. and M., where he received a civil engineering degree 27 years ago. His first job was in the civil engineering department of Albuquerque. He received several promotions until, 14 years ago, he was named city manager.

The Delaware Highway Commission has reelected **William A. McWilliams**, of Dover, as chief engineer of the highway department for 1948. A veteran of both world wars, he is completing his first term as chief engineer, having been advanced from assistant chief a year ago to succeed **W. W. Mack**, now special consultant for the department.

Ray E. Havens of the Indiana State Highway Commission's bridge engineering department, has been appointed city engineer for Kokomo, Ind. He has been with the highway department nine years. He was graduated



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- CURB FORMS
- CURB AND GUTTER FORMS
- SIDEWALK FORMS
- CONCRETE BUCKETS
- TOOL BOXES
- FINISHING TOOLS FOR CONCRETE ROADS

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from Purdue in 1910 with a degree in civil engineering and was employed by the Vincennes Bridge Co. from 1911 to 1932.

M. G. Johnson, a former city engineer, has been selected city engineer for Indianapolis, Ind. **C. E. Bacon** was named building commissioner.

Earl Phillips was named city engineer of Huntington, Ind., succeeding James B. Vernon, resigned. Phillips will also act as supervisor of sewage disposal and engineer for the city water works department.

Clarence N. Wiley, for many years field engineer for the Portland Cement Co. in Connecticut, is now associated with the Plasticrete Corp., Hamden.

Walter F. O'Connor, now a project engineer for the Greenfield division of the Indiana State Highway Commission, has been appointed city engineer of Anderson, Ind. A graduate of Purdue University, he served four years in the U. S. Army and was in Russia for two years.

The firm of **Shoecraft, Drury and McNamee**, consulting engineers, Ann Arbor, Mich., has been re-organized as **Drury, McNamee and Porter**, and **John C. Seeley** is a new member of the firm.

George S. Lyon, engineer, is the new manager of Covington, Ky.

Appointment of **M. W. Reed** as chief engineer, United States Steel Corporation of Delaware, has been announced. Mr. Reed, who has served with subsidiaries of United States Steel Corp. continuously since 1916, has been engineering vice-president, Carnegie-Illinois Steel Corp., since last April. He was graduated from the U. S. Naval Academy, with a bachelor of science degree in 1916.

E. F. Emmick, resident engineer for the Washington State Highway Department at Hoquiam for 23 years, has been transferred to the department's headquarters at Olympia as a consulting engineer in the plans and survey division. He has been succeeded at Hoquiam by Vern Dorsey, formerly of Olympia.

Samuel B. Morris, general manager and chief engineer for the Los Angeles Municipal Department of Water and Power, has been appointed to the Colorado River Board of California. Governor Earl Warren named the former Stanford University engineering dean to succeed the late E. F. Scattergood.

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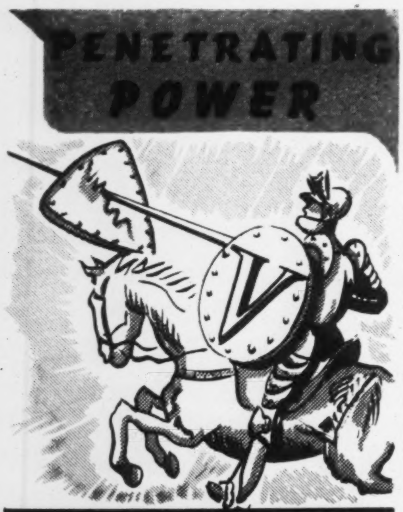

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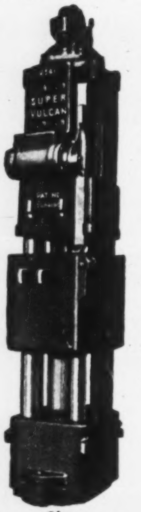

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Elections and Activities

Installation of officers and adoption of three resolutions calling for better financial status for engineers highlighted the recent convention at Phoenix of the Arizona section, American Society of Civil Engineers. G. L. McLane, district engineer in the Phoenix office of the FPRA, was installed president, and Col. George W. Howard, technical assistant to the chief of the Yuma Test Branch of Engineer Research and Development Laboratories, vice-president.

Ray Perin, of the Ira G. Perin Co., for 35 years the west coast representative for Elwell-Parker Trucks, has been elected president of the Materials Handling Association of Northern California. He is a graduate of Stanford University, 1930. He served with the Goodyear Rubber Co. at their British plant during the war.

Raymond J. Ashton, Gilbert W. Williams, Ralph Andersen, George W. Ashton, R. K. Brown, Chester P. Cahoon, Thomas B. Child and R. L. Irvine, all of Salt Lake City, and Arthur Jones, Cedar City, have been elected directors of the Utah Building and Construction Congress.

Wallace M. Lansford, professor of theoretical and applied mechanics, University of Illinois, has been elected president of the Central Illinois Section of the American Society of Civil Engineers. Other officers are Norman H. Gundrum, Springfield, Illinois State Division of Highways, first vice-president; James G. Clark, department of civil engineering, University of Illinois, second vice-president; and Ellis Danner, civil engineering department, University of Illinois, secretary-treasurer.

British Columbia Building Contractors Association elected P. E. L. Moase of Vancouver, B. C., as president and Charles Wilson of Nanaimo, B. C., vice-president.

The Louisiana Engineering Society will hold its 1948 annual meeting in New Orleans Jan. 8-10. The program will include technical sessions and exhibits, plant visits, a harbor inspection by boat, and discussion luncheons. Local chapters of the various national engineering societies and institutes of civil, chemical, electrical, illuminating, heating and ventilating, refrigerating,

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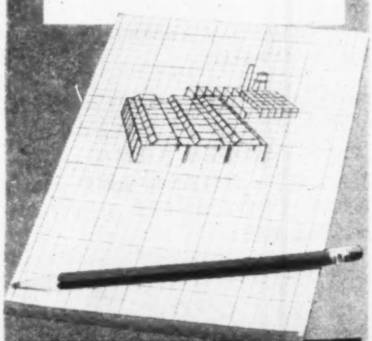

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military, mining and metallurgical, and mechanical engineers will participate. Speakers will include Harold W. Stoke, President of Louisiana State University, and Carl L. Svensen of the National Society of Professional Engineers, who will speak on laws affecting the registration of professional engineers.

M. J. Keranen of Bemidji has been elected president of the Ninth District Minnesota Association of Professional Engineers. Other officers elected are Clarence Turnell of Red Lake Falls, vice president; A. O. Nelson of Bemidji, secretary, and M. C. Peterson of Bemidji, executive committeeman. Delegates to the annual state convention are K. V. Pearson, R. L. Levonsen and Nelson and H. C. Dale, of Bemidji. Ed Johnson of Thief River Falls was named to the state nominating committee.

Haywood G. Dewey, Jr., chief of the Mississippi Basin Model Branch, Clinton, Miss., sub-office of the Waterways Experiment Station, Vicksburg, has been elected secretary-treasurer of the Mid-South Section, American Society of Civil Engineers. Mr. Dewey received his degree in civil engineering from Cornell University, in 1936 and his Master of Science degree from the University of Colorado, in 1939. He has been employed at the Experiment Station since September 1942. Prior to his transfer to the Experiment Station Mr. Dewey was employed by the Bureau of Reclamation, Denver, Colo. During the war he served four and a half years with the Corps of Engineers, Army of the United States, being separated with the rank of major.

Dean Lee H. Johnson, Jr., who was elected president of the Mid-South Section, American Society of Civil Engineers, was employed at the Experiment Station from 1935 to 1936. Mr. Johnson is at present dean of engineering at the University of Mississippi.

W. J. Gibson of Toronto, Ont., has been elected 1948 chairman of the Canadian Council of Professional Engineers and Scientists, succeeding F. S. Howes of Montreal.

The Westchester County Chapter, New York State Society of Professional Engineers, recently tendered a testimonial dinner to James C. Harding, county commissioner of public works.

Charles E. Jacob of Salt Lake City, professor of geophysics at University of Utah, has been appointed chairman of the committee on ground water hydraulics of the hydraulics division, American Society of Civil Engineers.

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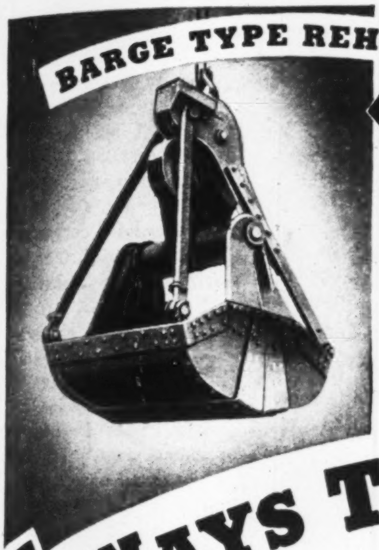
Manufacturers' Activities

Current developments among manufacturers relating to expansion of services, shifts in personnel, and other changes, include the following:

Field Sales Changes—THE DRESSER MFG. DIVISION has appointed W. L. Shelgren as Appalachian district manager, succeeding C. J. Gregg, retiring after 43 years. . . . Albert E. Brodigan is now regional representative in the Caribbean area for BORG-WARNER INTERNATIONAL CORP. . . . Rex Price is now the new Southwest district representative for the GALION IRON WORKS & MFG. CO. . . . A. H. Clem is field sales supervisor; P. C. Staples, Jr., is product supervisor, and R. R. Pierce has also been appointed to the product supervision department by the Special Chemicals Division of the PENNSYLVANIA SALT MFG. CO. . . . Kenneth F. Ames, general sales department member, and R. S. Cornell and Truman E. Sage, district sales representatives, have been named assistant sales managers of the Central, Eastern and Western sales divisions for CATERPILLAR TRACTOR CO. . . . Robert C. Robinson has been named eastern sales manager for SLOANE-BLABON CORP. . . . Bailey Meter Co. has appointed G. R. Mays manager of its St. Louis, Mo., branch office. . . . C. W. Myers is now divisional field engineer in charge of sales in Taxas, Oklahoma, Arkansas, Louisiana and Western Tennessee for the DAVEY COMPRESSOR CO. . . . Robert Highley has been named manager of the New York general sales division for the BEMIS BRO. BAG CO. . . . Robert C. Dunbar has been appointed West Coast representative for the AMERICAN HOIST & DERRICK CO. . . . INTERNATIONAL HARVESTER MOTOR TRUCK DIVISION recently promoted J. P. Feyen, formerly retail truck manager at Fresno, Calif., to assistant manager of the Spokane, Wash. branch. . . . Fred C. Wilcox has become New York manager of Moto-Mixer and Moto-Agitator sales for the CHAIN BELT CO. . . . Robert H. Fox, for some years sales engineer for SIX WHEELS, INC., has now formed his own company to be known as the ROBERT H. FOX CO. of Van Nuys, Calif.

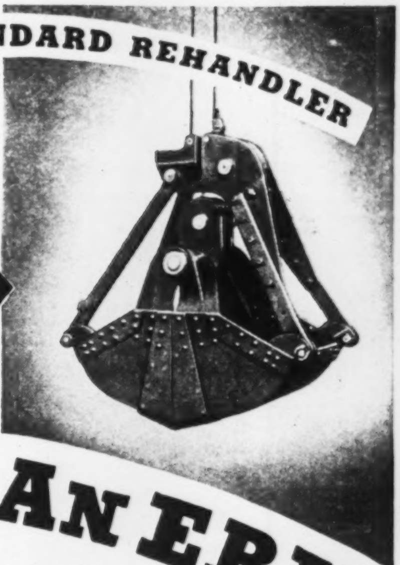
Dealer Appointments—THE CLARK-WILCOX CO. of Boston, Mass., has been named distributor in three New England states for the RALPH B. CARTER CO., manufacturers of sewage and water treatment equipment. . . . THE BUFFALO-SPRINGFIELD ROLLER CO. has

BARGE TYPE REHANDLER



Has advantage of long spread when open and wide scoops with a minimum of bucket weight. Particularly efficient for cleaning up material loaded to a shallow depth and distributed over a large area as on unloading barges and flats, and for stock pile work.

STANDARD REHANDLER

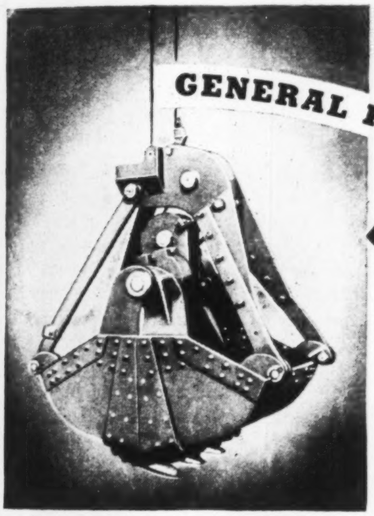


Recommended for general rehandling purposes and particularly efficient for unloading cars. You can work this bucket up to the sides and into the corners, eliminating necessity of hand shoveling to clean the car.

4 WAYS TO ORDER AN ERIE 2-LINE BUCKET

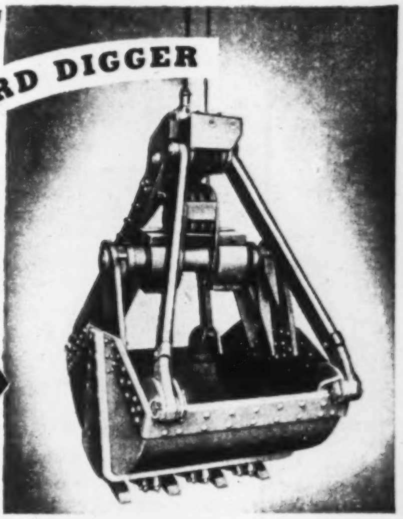
In clamshell service the bucket is the determining factor in the return on your crane investment. It is essential that size and style of bucket be consistent, both with the work to be done and your crane capacity. You must be able to maneuver to an advantage in order to move economically the maximum payload that your crane can handle at each cycle of operation. Write for new catalog on Erie 2-line clamshells.

GENERAL PURPOSE



Adaptable to a wide range of work which includes excavating as well as rehandling compact materials, covering practically every requirement of general contractors.

HARD DIGGER



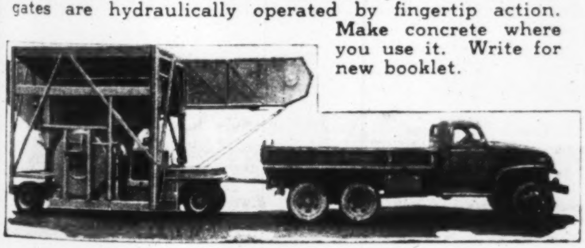
For dredging or severe underwater digging and the most difficult land excavation or any other work that subjects a bucket to severe service requiring unusual strength and durability.

ERIE STEEL CONSTRUCTION COMPANY

181 GEIST ROAD, ERIE, PA.

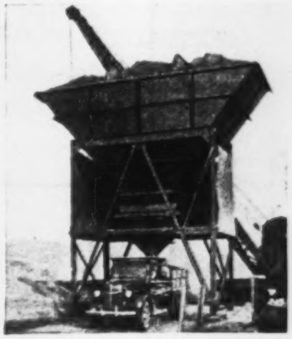
PORTABLE CONCRETE PLANTS

Erie combines an 8 rubber tired chassis with a complete concrete making plant. It includes 20 cu. yd., 3 part storage bin, vertical bucket elevator and weighing Aggre-Meter with extra beam for measuring water. All bin gates are hydraulically operated by fingertip action. Make concrete where you use it. Write for new booklet.



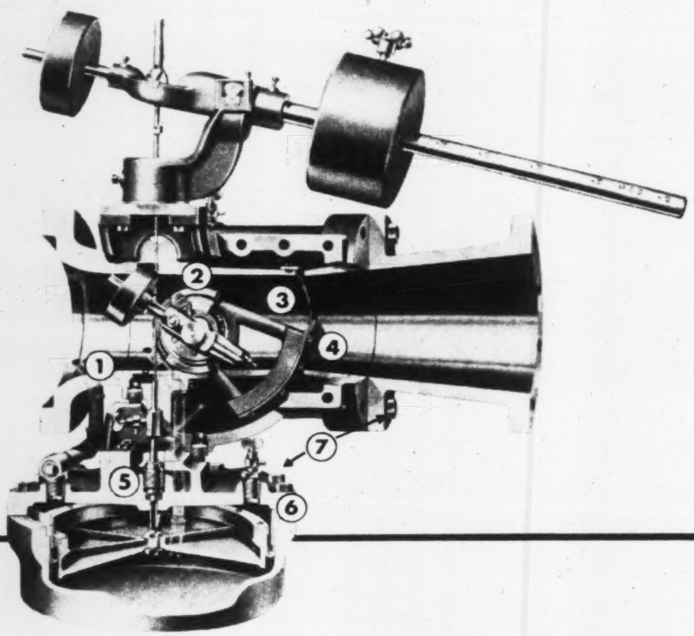
• ALSO AGGREMETERS

ERIE GA PORTABLE AGGREMETER PLANTS standardized in 54- 78- or 102 Ton capacities use a specially designed 3-material weighing Aggre-Meter in 1, 1¼, 1½ and 2 cu. yard capacities. We are producing these plants in quantity and can make good delivery. Booklet GA-1 tells its story — Outline your requirements.



7 GOOD REASONS

why more engineers, who demand the best in water works rate controllers, are specifying . . . "equal to Builders Model RCE":



1. Bronze throat with pressure-averaging chamber for greater accuracy.
2. Anti-friction bearings throughout: quick response to slightest change in flow.
3. Valve path entirely clear of air pockets — prevents "hunting".
4. Balanced control valve of arched design — will not buckle.
5. Hardened stainless steel piston rod . . . eliminates corrosion and bending.
6. Exclusive molded rubber piston seal won't bind, catch or reverse.
7. And something extra, — Everdur bronze bolts for easy maintenance.

For Bulletin 321B, address Builders-Providence, Inc.
(Division of Builders Iron Foundry), 51 Codding Street, Providence 1, R. I.

BUILDERS PRODUCTS

Venturi, Propeloflo and Orifice Meters • Venturi Filter Controllers and Gauges
Type M and Flo-Watch Instruments • Kennison Nozzles • Master Controllers •
Conveyoflo Meters • Wheeler Filter Bottoms • Filter Operating Tables
• Manometers • Chronoflo Telemeters

BUILDERS PROVIDENCE
BUILDERS
Instruments

announced appointment of the O. S. Stapley Co. of Phoenix, Ariz., as distributor in Arizona. . . . The Andrews Agency, Milwaukee, Wis., will handle engine and generator set advertising for the Buda Co. . . . Appointment of Vogel-Birch, Inc., Ashland, Ky., as a class B dealer has been announced by the Davey Compressor Co. . . . The Koehring Co. has appointed Sweeney Brothers Tractor Co. of Fargo, N. C., as distributor for Koehring products in South Dakota. . . . Bailey Meter Co. has opened new branch offices in New Orleans, La., and Schenectady, N. Y. . . . Borg-Warner Corp. has created a new division to handle its Ingersoll Utility Unit, and will consolidate management, sales and engineering functions in Chicago. . . . The Air Reduction Co. has formed a new wholly owned subsidiary—the Air Reduction Pacific Co.

Home Office Changes—Hugh Comer, Ala., cotton manufacturer, has been elected to the board of directors of the Allis-Chalmers Mfg. Co. . . . H. C. Peinert has become production manager of the High Explosives Section for the DuPont Co.'s explosives department. . . . The Chain Belt Co. has announced the election of B. F. Devine, L. B. McKnight and O. W. Carpenter as vice-presidents. . . . Dr. Fred E. Kendall has been appointed director of research for the Master Builders Co., Cleveland. . . . L. C. LeBron is now assistant manager of the explosives department's contractors division of the Hercules Powder Co. . . . G. E. Tenney is now service manager for the Lincoln Electric Co. . . . Thomas B. Hasler has been elected chairman of the board of directors of the Wilson Welder and Metals Co., Inc., a subsidiary of the Air Reduction Co. . . . Howard A. Marple has been appointed director of the newly created advertising department for the Monsanto Chemical Co. . . . J. L. Miller, formerly production superintendent, has been appointed plant manager of the Johns-Manville factory at Zelienople, Pa. . . . Carl R. Olson has been named vice-president of four companies within the Kaiser organization—Permanente Cement Co., Standard Gypsum Co. of California; Permanente Steamship Corp., and Glacier Sand & Gravel Co. . . . Howard L. Phillips is now assistant export manager for the Nordberg Mfg. Co. . . . The Louis Allis Co. has created three vice-presidencies to handle expanding operations. Elected were: Louis Allis, Jr.; Frank O. Kovich, and T. R. Wieseman. . . . John T. Brown has been named vice-president of the J. I. Case Co. . . . A. R. Bollaert has been appointed general manager of the Dicalite Division of Great Lakes Carbon Corp. . . .

New landmark rises in Boston

Architects and Engineers: Cram and Ferguson, Boston *Builder:* Turner Construction Co., New York

Located in Boston's Back Bay section, this imposing stone-faced office building is to be occupied by the John Hancock Mutual Life Insurance Company.

The 26-story structure will stand on 1567 steel H-Piles, from 79 ft to 120 ft long, driven to bed rock, and will contain 14,739 tons of structural steel framework. Air-conditioned from tower to basement, the building will contain dining rooms, lounges, an auditorium, and an employees' store. It is the first office building in the Boston area to use steel floors.

As fabricators and erectors of the steel frame for the John Hancock building, we are proud to have shared in the construction of this distinguished addition to the Boston skyline.

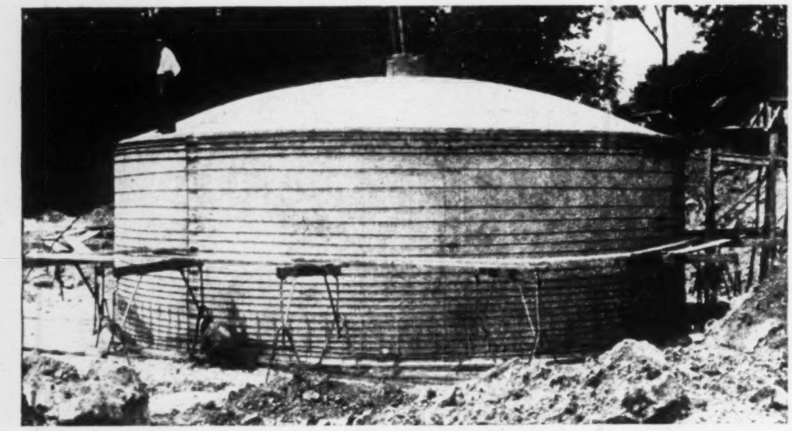
BETHLEHEM STEEL COMPANY, BETHLEHEM, PA.

On the Pacific Coast Bethlehem products are sold by Bethlehem Pacific Coast Steel Corporation

Export Distributor: Bethlehem Steel Export Corporation

FABRICATED STEEL CONSTRUCTION

BETHLEHEM
STEEL



• PRE-STRESSED "GUNITE" •

The picture shows a partially completed 40' diameter, 110,000 gallon pre-stressed "GUNITE" tank with a "GUNITE" dome roof, designed and built by us.

When this photo was made the tank was filled with water for leakage test. After the test showed the tank to be bottle-tight, two inch mesh reinforced "GUNITE" was placed over the outside to permanently protect the pre-stressed hoop rods. The tank was subsequently covered with earth, with 12" of fill over the dome.

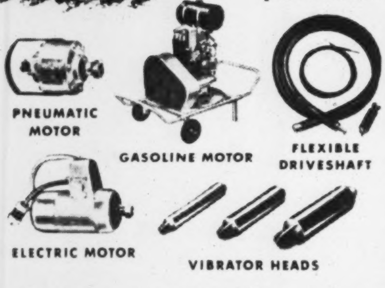
This photo illustrates our method of pre-stressing the hoop rods by means of several turnbuckles in each hoop.

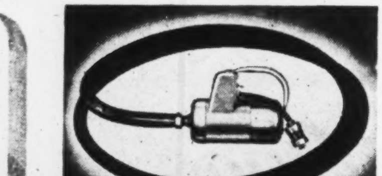
Our Bulletin A2300 describes and illustrates pre-stressed "GUNITE" construction in detail and also scores of other uses of "GUNITE."

Write today for your free copy of Bulletin A2300.

CEMENT GUN COMPANY
"GUNITE" CONTRACTORS
GENERAL OFFICES—ALLENTOWN, PENNA., U.S.A.

VIBER INTERCHANGEABILITY offers VERSATILITY in concrete placement





The standardized line of **VIBER** Vibrators is a complete combination of interchangeable units readily adaptable to all types of concrete construction. Varying job requirements are easily met by a rapid change of vibrator heads or length of flexible drive, eliminating on-the-job delays and the necessity of purchasing excessive equipment. In the development of VIBER Vibrators every consideration has been given to employing the best method for concrete compaction while reducing construction time and concrete placing costs for the contractor.

The three illustrations to the right are typical combinations of VIBER's interchangeable units.

Please write for **VIBER's** *illustrated catalog*

VIBER COMPANY EST 1931

ORIGINATORS OF INTERNAL CONCRETE VIBRATION

THE UNITED STATES STEEL CORP. of Delaware has announced the appointment of R. Conrad Cooper as industrial engineering vice-president. . . . W. H. Scherer has been appointed general manager and a director of the RANSOME MACHINERY CO. . . . William O. Lawrence has been appointed assistant manager of the Buffington, Ind., plant of UNIVERSAL ATLAS CEMENT CO. . . . William T. Kelly, Jr., has been elected first vice-president of AMERICAN BRAKEBLOK DIVISION of the AMERICAN BRAKE SHOE CO. . . . Myron W. Krueger has been elected treasurer and Howard P. Maxton secretary of the RAYMOND CONCRETE PILE CO. . . . Joseph J. Hite has become assistant chief engineer of the AMERICAN HOIST & DERRICK CO. . . . Henry Horandt is now assistant to the vice-president and Pacific Coast manager for the NEPTUNE METER CO. . . . W. D. Garwood, production superintendent at the Repauno plant of the DUPONT CO. has been named production manager of the Special Products and Black Powder Section.

Name Changes—The COAST EQUIPMENT CO. of San Francisco has become a division of the NOSMAN EQUIPMENT CO., a California corporation . . . The PHOENIX BRIDGE CO. of Phoenixville, Pa., has been succeded by the PHOENIX BRIDGE CORP. . . . STRAND BUILDING PRODUCTS CO. of Detroit was recently bought in its entirety by the DETROIT STEEL PRODUCTS CO. of the same city. . . . The NICHOLS WIRE & STEEL CO. of Davenport, Iowa, has changed its name to NICHOLS WIRE & ALUMINUM CO. . . . THE AMERICAN STRUCTURAL PRODUCTS CO., Toledo, Ohio, recently was incorporated to conduct the building materials business of the OWENS-ILLINOIS GLASS CO. . . . A change in name to the ZONOLITE CO. has been announced by the organization formerly known as UNIVERSAL ZONOLITE INSULATION CO.

Personalities—With the closing of its Harrisburg, Pa., branch office, the GALION IRON WORKS & MFG CO. has announced retirement of R. E. Forsythe, branch manager, after 34 years with the company. . . . Harry F. Gracey, training director in charge of management development for SKF INDUSTRIES, INC., has been elected president of the Pennsylvania Society of Training Directors. . . . J. S. Young, president of the LEHIGH-PORTLAND CEMENT CO., recently was re-elected a member of the National Industrial Conference Board. . . . William H. Kershaw, assistant general sales manager of the TEXAS CO., retired recently after 37 years with the company. . . . Y. T. Leftwich, western representative for the GALION IRON WORKS & MFG. CO., will retire from active service next spring.

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